VPDES PERMIT PROGRAM FACT SHEET

This document gives pertinent information concerning the reissuance of the VPDES Permit listed below. This permit is being processed as a Major, Municipal permit. The discharge results from the operation of a 67 MGD wastewater treatment plant. This permit action consists of updating the proposed effluent limits to reflect the current Virginia WQS (effective January 6, 2011), updating permit language as appropriate, and authorizes reclamation and reuse of 6.6 MGD of the 67 MGD design flow. The effluent limitations and special conditions contained in this permit will maintain the Water Quality Standards of 9VAC25-260 et seq.

1.	Facility Name and Mailing Address:	Noman M. Cole Pollution Control Plant P. O. Box 268, Lorton, VA 22079	SIC Code :	4952 WWTP
	Facility Location:	9399 Richmond Highway Lorton, VA 22079	County:	Fairfax
	Facility Contact Name:	Michael McGrath, P.E	Telephone Number:	703-550-9740 Ext. 250
	Facility E-mail Address:	Michael.McGrath@fairfaxcounty.gov		

2. Permit No.: VA0025364 — Expiration Date of previous permit: September 28, 2013

Other VPDES Permits associated with this facility: VAR0530331 (General Permit for Stormwater)
VAN010022 (General Permit for Nutrients)

Other Permits associated with this facility: NVRO070714 (Title V Air)

E2/E3/E4 Status: E4

3.	Owner Name:	Fairfax County Board of Supervisors		
	Owner Contact/Title:	Michael McGrath, Director	Telephone Number:	703-550-9740 Ext.250
	Owner E-mail Address:	Michael.McGrath@fairfaxcounty.gov		

4.	Application Complete Date:	March 12, 2013		
	Permit Drafted By:	Joan C. Crowther	Date Drafted:	9/3/13
	Draft Permit Reviewed By:	Alison Thompson	Date Reviewed:	9/9-10/13
	WPM Review By:	Bryant Thomas	Date Reviewed:	10/9/13
	Public Comment Period :	Start Date:	End Date:	

5. Receiving Waters Information: See Attachment 1 for the Flow Frequency Determination

Receiving Stream Name :	Pohick Creek	Stream Code:	1aPOH
Drainage Area at Outfall:	32 sq.mi.	River Mile:	4.79
Stream Basin:	Potomac River	Subbasin:	Potomac River
Section:	7	Stream Class:	III
Special Standards:	b	Waterbody ID:	VAN-A16R
7Q10 Flow:	0.44 MGD	7Q10 High Flow:	3.94 MGD (Nov-Mar)
1Q10 Flow:	0.21 MGD	1Q10 High Flow:	3.23 MGD (Nov – Mar)
30Q10 Flow:	1.3 MGD	30Q10 High Flow:	6.3 MGD (Nov – Mar)
Harmonic Mean Flow:	5.4 MGD	30Q5 Flow:	2.2 MGD

6. Statutory or Regulatory Basis for Special Conditions and Effluent Limitations:

✓	State Water Control Law	✓	EPA Guidelines
✓	Clean Water Act	✓	Water Quality Standards
✓	VPDES Permit Regulation	✓	Other *(*Policy for the Potomac River Embayments (9VAC25-415 *et.seq.*)) *
✓	EPA NPDES Regulation		

7. Licensed Operator Requirements: Class 1

8. Reliability Class: Class 1

9. Permit Characterization:

	Private		Effluent Limited	✓	Possible Interstate Effect
	Federal	✓	Water Quality Limited		Compliance Schedule Required
	State	✓	Whole Effluent Toxicity Program Required		Interim Limits in Permit
✓	POTW	✓	Pretreatment Program Required		Interim Limits in Other Document
✓	TMDL				

*Historical Note - Development of the *Policy for the Potomac River Embayments* (9VAC25-415 *et seq.*):

The State Water Control Board adopted the Potomac Embayment Standards (PES) in 1971 to address serious nutrient enrichment problems evident in the Virginia embayments and Potomac River at the time. These standards applied to sewage treatment plants discharging into Potomac River embayments in Virginia and for expansions of existing plants discharging into the non-tidal tributaries of these embayments. The standards were effluent limitations for BOD_5, unoxidized nitrogen, total phosphorus, and total nitrogen:

Parameter	PES Standard (monthly average)
BOD_5	3 mg/L
Unoxidized Nitrogen	1 mg/L (April – October)
Total Phosphorus	0.2 mg/L
Total Nitrogen	8 mg/L (when technology is available)

Questions arose due to the fact that the PES were blanket effluent limitations that applied equally to different bodies of water. Therefore, in 1978, the State Water Control Board committed to reevaluate the PES. In 1984, a major milestone was reached when the Virginia Institute of Marine Science (VIMS) completed state-of-the-art models for each of the embayments. The Board then selected the Northern Virginia Planning District Commission (NVPDC) to conduct wasteload allocation studies of the Virginia embayments using the VIMS models. In 1988, these studies were completed and effluent limits that would protect the embayments and the main stem of the Potomac River were developed for each major facility.

In 1991 and 1992, several Northern Virginia jurisdictions with embayment treatment plants submitted a petition to the Board requesting that the Board address the results of the VIMS/NVPDC studies. Their petition requested revised effluent limitations and a defined modeling process for determining effluent limitations.

The recommendations in the petition were designed to protect the extra sensitive nature of the embayments along with the Potomac River that have become a popular recreational resource during recent years. The petition included requirements more stringent than would be applied using the results of the modeling/allocation work conducted in the 1980s. With the inherent uncertainty of modeling, the petitioners question whether the results of modeling would provide sufficient protection for the embayments. By this petition, the local governments asked for continued special protection for the embayments based upon a management approach that uses stringent effluent limits. They believed this approach had proven successful over the past two decades. In addition, the petition included a modeling process that would be used to determine if more stringent limits would be needed in the future due to increased wastewater discharges.

The State Water Control Board adopted the petition, with revisions, as a regulation on September 12, 1996. The regulation is entitled *Policy for the Potomac River Embayments* (PPRE) (9VAC25-415 *et seq*.). On the same date, the Board repealed the old PES. The new regulation became effective on April 3, 1997, and contained the following effluent limits:

Parameter	PPRE Standards (monthly average)
$cBOD_5$	5 mg/L
TSS	6 mg/L
Total Phosphorus	0.18 mg/L
Ammonia as Nitrogen	1 mg/L

10. Wastewater Sources and Treatment Description:

The Noman M. Cole, Jr. Pollution Control Plant is an advanced wastewater treatment facility. Treatment process includes mechanical screening, primary sedimentation, methanol enhanced aeration (activated sludge), clarification, equalization, chemical clarification with ferric chloride for phosphorus removal, filtration, chlorination, dechlorination, defoaming, and reuse. Flow is equalized at a couple of points in the process.

The treatment plant has two sources of electrical feed in case of interruption to a power source. In addition, there are three electrical generators providing backup power to the following unit operations: bar screen, raw wastewater pumps, flash mix tanks, primary clarifiers, primary sludge degritters, equalization basins, ASE pumps, filter effluent pumps, filter backwash pumps, chlorination, and dechlorination. Outfall 001 is the effluent discharge to the Pohick Creek. Outfall 650 is the reclamation and reuse discharge into the distribution system.

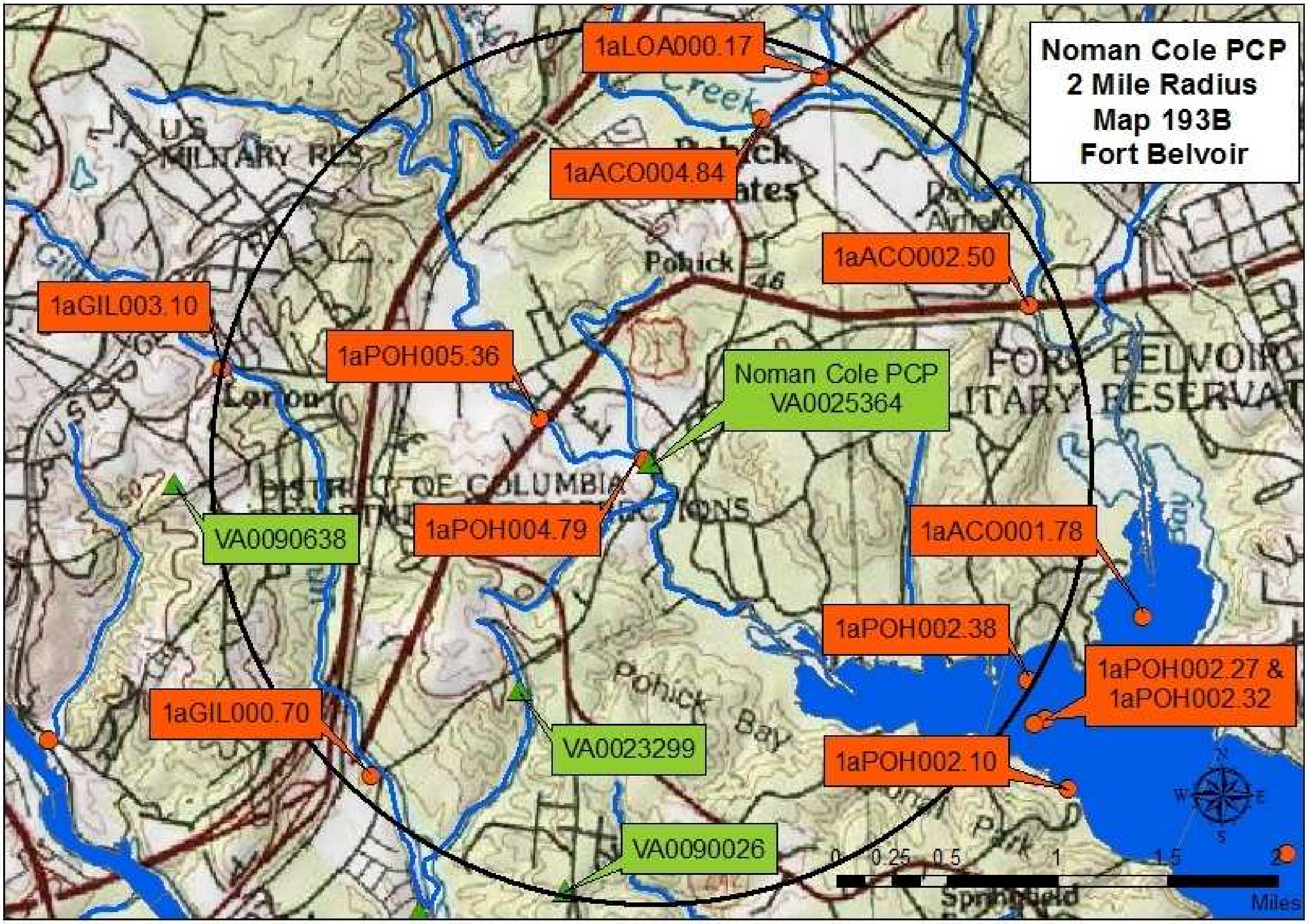
The facility is currently constructing new moving bed biofilm reactors (MBBR), increased flow equalization, filter improvements, and replacement and construction of new screens (Project name - Enhanced Nutrient Removal Moving Bed Biofilm Reactor (MBBR) and Related Modifications). The construction is projected to be completed in 2013-14. This upgrade should bring the facility's treatment efficiency for Total Nitrogen from 7.0 mg/L to 3.0 mg/L annual concentration.

See Attachment 2 for a facility schematic/diagram.

TABLE 1 – Outfall Description

Outfall Number	Discharge Sources	Treatment	Design Flow(s)	Outfall Latitude and Longitude
001	Domestic and/or Commercial Wastewater	See Item 10 above.	67 MGD	38° 41' 53" N 77° 12' 03" W
650	Domestic and/or Commercial Wastewater	See Item 10 above.	6.6 MGD	38°41'57.93" N 77°12'19.058 W

Noman M. Cole Pollution Control Plant, Fort Belvoir USGS Topographic Map (DEQ #193B)



11. Sludge Treatment and Disposal Methods:

Sludge produced by treatment is degritted, thickened, dewatered, incinerated, and the ash is disposed in a sanitary landfill. Grit and screening are co-disposed of at the 1-95 Energy Resource Recover Facility (ERRF). In the event of incineration failure, sludge will be transported to the King George Landfill in King George, Virginia as part of a back-up sludge hauling and disposal contract.

12. Discharges, Intakes, Monitoring Stations, Other Items in Vicinity of Discharge on Pohick Creek

TABLE 2 - DEQ's Ambient Water Quality Monitoring Stations on Pohick Creek within a 2 mile radius	
DEQ Station Number	**Ambient Water Quality Monitoring Station Description**
1aPOH005.36	U.S. Route 1 Bridge upstream from the Noman Cole PCP Outfall 001. (Approximately 0.57 rivermiles upstream of the facility's outfall location.)
1aPOH004.79	Route 611 Bridge just upstream from the Noman Cole PCP Outfall 001.
1aPOH002.38	Upstream & Across from Park Ramps (Pohick Bay Regional Park)

13. Material Storage:

See Attachment 3 for Chemical Storage List.

14. Site Inspection:

Performed by Rebecca Johnson on September 25, 2012. (See Attachment 4).

15. Receiving Stream Water Quality and Water Quality Standards:

a) Ambient Water Quality Data

This facility discharges into Pohick Creek. DEQ monitoring station 1aPOH005.36 is located at the Rt. 1 Bridge crossing, approximately 0.6 miles upstream of Outfall 001. This station is a trend monitoring station and has been sampled regularly since 2002. There is also a DEQ station, 1aPOH004.79, located at the Rt. 611 Bridge crossing, approximately 0.04 miles upstream of Outfall 001. This station was last sampled in 2005/2006 for a PCB special study. Previous to this, the station was last regularly sampled in the 1970's. The following is the water quality summary for Pohick Creek, as taken from the Draft 2012 Integrated Report*:

DEQ ambient water quality monitoring stations 1aPOH004.79, at Route 611, and 1aPOH005.36 at Route 1 were used for the following assessment.

E. coli monitoring finds a bacterial impairment, resulting in an impaired classification for the recreation use.

The aquatic life and wildlife uses are considered fully supporting. The fish consumption use is fully supporting with observed effects due to SPMD data revealed an exceedance of the human health criteria of 0.64 parts per billion (ppb) polychlorinated biphenyls (PCBs).

**Virginia's Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently awaiting final approval.*

The rest of this page is intentionally left blank.

b) 303(d) Listed Stream Segments and Total Maximum Daily Loads (TMDLs) from the Draft 2012 Integrated Report*

TABLE 3 - 303(d) Impairment and TMDL Information for the Receiving Stream Segment

Waterbody Name	Impaired Use	Cause	TMDL completed	WLA	Basis for WLA	TMDL Schedule
Pohick Creek	Recreation	*E. coli*	No	N/A	N/A	2018

TABLE 4 - 303(d) Impairments and TMDLs Information for Downstream

Waterbody Name	Impaired Use	Cause	Distance From Outfall	TMDL completed	WLA	Basis for WLA	TMDL Schedule
Pohick Creek (tidal)	Fish Consumption	Benzo(k)-fluoranthene	1 mile	No	N/A	N/A	2014
		PCBs	1 mile	Tidal Potomac PCB 10/31/2007	5.92 grams/year PCB	0.064 ng/L --- 67 MGD	N/A
	Aquatic Life	pH	2.4 miles	No	N/A	N/A	2024

TABLE 5 - 303(d) Impairments and TMDLs Information in the Chesapeake Bay

Waterbody Name	Impaired Use	Cause	Distance From Outfall	TMDL completed	WLA	Basis for WLA	TMDL Schedule
Chesapeake Bay	Aquatic Life	Total Nitrogen	---	Chesapeake Bay TMDL 12/29/2010	612,158 lbs/yr TN	Edge of Stream (EOS) Loads	N/A
		Total Phosphorus			36,729 lbs/yr TP		
		Total Suspended Solids			6,121,575.6 lbs/yr TSS		

**Virginia's Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently awaiting final approval.*

Significant portions of the Chesapeake Bay and its tributaries are listed as impaired on Virginia's 303(d) list of impaired waters for not meeting the aquatic life use support goal, and the 2010 Virginia Water Quality Assessment 305(b)/303(d) Integrated Report indicates that much of the mainstem Bay does not fully support this use support goal under Virginia's Water Quality Assessment guidelines. Nutrient enrichment is cited as one of the primary causes of impairment. EPA issued the Bay TMDL on December 29, 2010. It was based, in part, on the Watershed Implementation Plans developed by the Bay watershed states and the District of Columbia.

The Chesapeake Bay TMDL addresses all segments of the Bay and its tidal tributaries that are on the impaired waters list. As with all TMDLs, a maximum aggregate watershed pollutant loading necessary to achieve the Chesapeake Bay's water quality standards has been identified. This aggregate watershed loading is divided among the Bay states and their major tributary basins, as well as by major source categories [wastewater, urban storm water, onsite/septic agriculture, air deposition]. Fact Sheet Section 17.g provides additional information on specific nutrient limitations for this facility to implement the provisions of the Chesapeake Bay TMDL.

The planning statement dated May 8, 2013 is found in Attachment 5.

c) Receiving Stream Water Quality Criteria

Part IX of 9VAC25-260 (360-550) designates classes and special standards applicable to defined Virginia river basins and sections. The receiving stream Pohick Creek is located within Section 7 of the Potomac River Basin, and classified as a Class III water.

At all times, Class III waters must achieve a dissolved oxygen (D.O.) of 4.0 mg/L or greater, a daily average D.O. of 5.0 mg/L or greater, a temperature that does not exceed 32°C, and maintain a pH of 6.0-9.0 standard units (S.U.).

2013 Freshwater Water Quality/Wasteload Allocation Analysis (Attachment 6) details other water quality criteria applicable to the receiving stream separated by the following seasons: November – March and April – October. These seasons are based on the seasonality of the *Policy of the Potomac River Embayments* (9VAC25-415 *et seq.*). The receiving stream's and effluent's pH and temperature values used in this analysis are from the 2008 reissuance; namely, the stream data from September 2001 through March 2008 and the effluent data from January 2003 through March 2008. For this reissuance, the pH effluent data for January 2010 through March 2013 were reviewed, resulting in similar 90th percentile value for the November through March and April through October timeframes as found in the 2008 permit reissuance process. Recent effluent temperature and stream pH and temperature data were not reviewed for this permit reissuance. Therefore, the 2008 effluent temperature and pH and stream temperature and pH were carried forward for this reissuance.

TABLE 6 - 2008 Data Used for 2013 Freshwater / Wasteload Allocation Analysis *

Season	90th Percentile Effluent pH (S.U.)	90th Percentile Stream pH (S.U.)	90th Percentile Effluent Temperature (°C)	90th Percentile Stream Temperature (°C)	Stream Hardness (mg/L)	Effluent Hardness (mg/L)
November – March	7.1	8.01	21	16.9	42	87
April – October	7.3	7.41	26	23.77	38	123

*Taken from the 2008 Permit Reissuance Fact Sheet (See Attachment 7 for data)

Ammonia:

During the 2008 reissuance process, the September 2001 to March 2008 receiving stream's temperature and pH and January 2003 to March 2008 effluent temperature and pH data were used to calculate the Ammonia criteria for the November through March timeframe. The resulting chronic Ammonia criteria were significantly different from what was calculated and used during the prior two (1998 and 2003) permit reissuances. The 2008 November through March Ammonia effluent limitations were 4.1 mg/L monthly average and 4.9 mg/L weekly maximum. However, since the facility had demonstrated that it was capable of consistently meeting the stricter November through March Ammonia effluent limitations that were established in the 1998 permit reissuance of 2.2 mg/L monthly average and 2.6 mg/L weekly maximum, these ammonia limits were carried forward in the 2008 reissuance.

Thus it is assumed that if the ammonia analysis were done during this permit reissuance process, the same results would occur. Therefore, the same rationalization used in the 2008 permit reissuance process will be carried forward in this reissuance process and the November through March Ammonia effluent limitations that were established in the 1998 permit reissuance of 2.2 mg/L monthly average and 2.7 mg/L weekly maximum will remain.

Ammonia effluent limitations for the April – October time period are established by the Policy for the Potomac River Embayment (PPRE)(9VAC25-415).

Metals Criteria:

The Water Quality Criteria for some metals are dependent on the receiving stream's hardness (expressed as mg/L calcium carbonate). The receiving stream's hardness data (13 data points) was reviewed and evaluated for the period of May 1985 –December 1985, September 2001 – December 2001, February 2002 – June 2002, March 2003 and March 2005. Using this hardness data, the receiving stream's hardness averages were determined for the November – March timeframe to be 42 mg/L and April through October to be 38 mg/L. The plant's effluent hardness average for these same time period were determined by effluent samples (15 data points) collected for the following timeframes: May 2002 through September 2002; July 2003; December 2006; and May through September 2007. Using this hardness data, the effluent hardness averages were determined for the November – March timeframe to be 87 mg/L and April through October to be 123 mg/L. These stream and hardness values were used to the metals criteria. The hardness-dependent metals criteria are found in Attachment 6.

Bacteria Criteria:

The Virginia Water Quality Standards at 9VAC25-260-170A state that the following criteria shall apply to protect primary recreational uses in surface waters:

E. coli bacteria per 100 ml of water shall not exceed a monthly geometric mean of 126 n/100 mls for a minimum of four weekly samples taken during any calendar month.

d) Receiving Stream Special Standards

The State Water Control Board's Water Quality Standards, River Basin Section Tables (9VAC25-260-360, 370 and 380) designates the river basins, sections, classes, and special standards for surface waters of the Commonwealth of Virginia. The receiving stream, Pohick Creek, is located within Section 7 of the Potomac River Basin. This section has been designated with a special standard of b.

Special Standard "b" (*Policy for the Potomac River Embayments* (PPRE) (9VAC25-415 *et seq*.)) established effluent standards for all sewage plants discharging into Potomac River embayments and for expansions of existing plants discharging into non-tidal tributaries of these embayments. 9VAC25-415, Policy for the Potomac Embayments controls point source discharges of conventional pollutants into the Virginia embayment waters of the Potomac River, and their tributaries, from the fall line at Chain Bridge in Arlington County to the Route 301 Bridge in King George County. The regulation sets effluent limits for $cBOD_5$, total suspended solids, phosphorus, and ammonia, to protect the water quality of these high profile waterbodies.

e) Threatened or Endangered Species

The Virginia DGIF Fish and Wildlife Information System Database was searched on August 12, 2013, for records to determine if there are threatened or endangered species in the vicinity of the discharge. The only state threatened species identified within a 2 mile radius of the discharge was the wood turtle (*Glyptempys insculpta)*.

In accordance with the VPDES Memorandum of Understanding dated April 16, 2007 with the Virginia Department of Conservation and Recreation (DCR) and other agencies, this facility's discharge information was forwarded to DCR for their review on May 6, 2013. By letter dated May 31, 2013, DCR responded by stating that no state threatened or endangered species were in the project vicinity.

The stream (Pohick Creek) that the facility discharges to is within a reach identified as having an Anadromous Fish Use. It is staff's best professional judgment that the proposed limits are protective of this use.

See Attachment 8 for DGIF's database results and DCR's May 31, 2013 letter.

f) Adjacent State's Water Quality Standards

Noman M. Cole PCP discharges to Pohick Creek, which is a tributary to the Potomac River. The discharge is approximately 5 miles from the Maryland State line. Staff reviewed the State of Maryland's Water Quality Standards (26.08.02.03-2 – Numerical Criteria for Toxic Substances in Surface Waters) and believes that the effluent limitations established in this permit will comply with Maryland's water quality standards at the point Pohick Creek enters the Potomac River. The State of Maryland was sent a copy of the draft permit on October 31, 2013 for their review and comments. As of xxx, no comments have been received.

16. Antidegradation (9VAC25-260-30):

All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

During the 2008 permit reissuance, the receiving stream was classified as Tier 1 based on the fact that this is an urban stream and was on the 1998 303(d) listing for ammonia. Another factor influencing the Tier 1 determination is that the discharge volume is much greater than the flow in the stream. It is staff's best professional opinion that the instream waste concentration is essentially 100% during critical stream flows, and the water quality of the stream will mirror the quality of the effluent. Permit limits proposed have been established by determining wasteload allocations which will result in attaining and/or maintaining all water quality criteria which apply to the receiving stream, including narrative criteria. These wasteload allocations will provide for the protection and maintenance of all existing uses.

17. Effluent Screening, Wasteload Allocation, and Effluent Limitation Development:

To determine water quality-based effluent limitations for a discharge, the suitability of data must first be determined. Data is suitable for analysis if one or more representative data points is equal to or above the quantification level ("QL") and the data represent the exact pollutant being evaluated.

Next, the appropriate Water Quality Standards are determined for the pollutants in the effluent. Then, the Wasteload Allocations (WLA) are calculated. The WLA values are then compared with available effluent data to determine the need for effluent limitations. Effluent limitations are needed if the 97th percentile of the daily effluent concentration values is greater than the acute wasteload allocation or if the 97th percentile of the four-day average effluent concentration values is greater than the chronic wasteload allocation. Effluent limitations are the calculated on the most limiting WLA, the required sampling frequency, and statistical characteristics of the effluent data.

a) Effluent Screening:
Effluent data obtained from permit application and discharge monitoring reports from January 2010 to June 2013 were reviewed and determined to be suitable for evaluation. During this time period, there was only one exceedence of the effluent limitations; namely, April 2013 $cBOD_5$ maximum concentration.

The following pollutants require a wasteload allocation analysis*:* Ammonia as Nitrogen and Total Residual Chlorine.

b) Mixing Zones and Wasteload Allocations (WLAs):

Wasteload allocations (WLAs) are calculated for those parameters in the effluent with the reasonable potential to cause an exceedance of water quality criteria. The basic calculation for establishing a WLA is the steady state complete mix equation:

$$WLA \quad \frac{C_o\,[\,Q_e + (\,f\,)\,(Q_s\,)\,] - [\,(\,C_s\,)\,(\,f\,)\,(\,Q_s\,)\,]}{Q_e}$$

Where:

WLA	Wasteload allocation
C_o	In-stream water quality criteria
Q_e	Design flow
Q_s	Critical receiving stream flow (1Q10 for acute aquatic life criteria; 7Q10 for chronic aquatic life criteria; 30Q10 for ammonia criteria; harmonic mean for carcinogen-human health criteria; and 30Q5 for non-carcinogen human health criteria)
f	Decimal fraction of critical flow
C_s	Mean background concentration of parameter in the receiving stream.

The water segment receiving the discharge via Outfall 001 has a 7Q10 flow (April – October) of 0.44 MGD, but since the design flow of the facility is 67.0 MGD, the instream waste concentration is >99%. It is staff's best professional opinion that mixing is instantaneous, and as such, there is no mixing zone and the WLA is equal to the Water Quality Criteria.

Staff derived wasteload allocations where parameters are reasonably expected to be present in an effluent (e.g., total residual chlorine where chlorine is used as a means of disinfection) and where effluent data indicate the pollutant is present in the discharge above quantifiable levels. With regard to the Outfall 001 discharge, ammonia as N is likely present since this is a WWTP treating sewage, total residual chlorine may be present since chlorine is used for disinfection.

c) Effluent Limitations from the Policy for the Potomac River Embayment (PPRE)(9VAC25-415), Outfall 001

The PPRE included monthly average effluent limits that apply to all sewage treatment plants:

Parameter	Monthly Average (mg/L)
$cBOD_5$	5
Total Suspended Solids	6
Total Phosphorus	0.18
NH_3 (Apr 1 – Oct 31)	1

The PPRE states that the "above limitations shall not replace or exclude the discharge from meeting the requirements of the State's Water Quality Standards (9VAC25-260-10 et seq.)."

d) Effluent Limitations Toxic Pollutants, Outfall 001

9VAC25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Those parameters with WLAs that are near effluent concentrations are evaluated for limits.

The VPDES Permit Regulation at 9VAC25-31-230.D. requires that monthly and weekly average limitations be imposed for continuous discharges from POTWs and monthly average and daily maximum limitations be imposed for all other continuous non-POTW discharges.

1) Ammonia as N:

Ammonia as N (April through October)
The next table summarizes the ammonia limits evaluated during this reissuance:

Table 7 - Ammonia (April through October)	
Source of the Monthly Average Limit	**Monthly Average Limit**
Policy for the Potomac River Embayments (PPRE)	1 mg/L
Wasteload Allocation Evaluation (Attachment 9 using the 2008 data)	2.4 mg/L

Since the PPRE is more stringent than the current Water Quality Criteria, the April through October monthly average limit will be 1.0 mg/L. The weekly average limit will be 1.5 mg/L based on the PPRE monthly average limit of 1.0 mg/L multiplied by a 1.5 multiplier.

Ammonia as N (November through March)
Staff evaluated the effluent and stream data (based on the 2008 permit reissuance and has concluded that it was significantly different from what was used in the 1998 permit reissuance; however, the facility has demonstrated that it is capable of consistently meeting the existing Ammonia effluent limitations so the existing ammonia limitations of 2.2 mg/L monthly average and 2.7 mg/L weekly average are proposed to continue in the reissued permit. (Attachment 9)

2) Total Residual Chlorine:

Chlorine is used for disinfection and is potentially in the discharge. Staff calculated WLAs for TRC using current critical flows and the mixing allowance. In accordance with current DEQ guidance, staff used a default data point of 0.2 mg/L and the calculated WLAs to derive limits. A monthly average of 0.008 mg/L and a weekly average limit of 0.010 mg/L are proposed for this discharge (Attachment 10). The Water Quality Criteria/Wasteload Allocation Analysis (April – October) was used to determine the Total Residual Chlorine effluent limitations.

3) Metals/Organics:

Metals and organics data were reviewed and no reasonable potential was found; therefore, no effluent limits are proposed.

e) Effluent Limitations and Monitoring, Outfall 001 – Conventional and Non-Conventional Pollutants

There are no changes to dissolved oxygen (D.O.), carbonaceous biochemical oxygen demand-5 day ($cBOD_5$), total suspended solids (TSS), ammonia, Total Phosphorus, and pH limitations proposed.

pH limitations are set at the water quality criteria.

Dissolved oxygen (D.O.) has a daily minimum concentration of 6.0 mg/L and is based on original modeling conducted (See Attachment 11) and is set to meet the water quality criteria for D.O. in the receiving stream.

The $cBOD_5$ monthly average concentration is 5 mg/L and is based on the PPRE. The weekly average concentration is 8 mg/L. Modeling has demonstrated that this level is protective of Water Quality Standards.

The TSS monthly average concentration is 6.0 mg/L and is based on the PPRE. The weekly average concentration is 9.0 mg/L.

The Total Phosphorus limitation of 0.18 mg/L is based on the PPRE. The weekly average concentration is 0.27 mg/L. Modeling has demonstrated that this level is protective of Water Quality Standards.

E. coli limitations are in accordance with the Water Quality Standards 9VAC25-260-170.

The weekly average concentrations for the PPRE parameters were calculated by using the monthly average concentration and multiplying by a 1.5 multiplier.

f) Effluent Limitations and Monitoring Summary - Other

The mass loading (kg/d) for monthly and weekly averages were calculated by multiplying the concentration values (mg/L), with the flow values (in MGD) and a conversion factor of 3.785.

An ammonia loading limit for the summer months is included in the permit because the basis for this limit is PPRE and not the toxic water quality criteria.

Monitoring frequencies are in conformance with Agency guidance with the exception of $cBOD_5$. The monitoring frequency for $cBOD_5$ was reduced during the 2003 permit reissuance to 5D/W based on the facility's outstanding performance. During the 2008 permit reissuance, the permittee requested that the $cBOD_5$ frequency of analysis be reduced further. Due to the continual facility's outstanding performance and E4 rating, the $cBOD_5$ frequency of analysis was reduced to 3D/W with the stipulation that if the $cBOD_5$ effluent limitation was violated, the frequency of analysis would immediately be increased to 5D/W and remain at this frequency for the term of the permit. As stated in Section 17g of this Fact Sheet, the April 2013 $cBOD_5$ maximum concentration exceeded the permit effluent limitation. It's staff best professional judgment that since the monthly average $cBOD_5$ was not exceeded for April 2013, there is no need to increase the sample frequency. Monitoring once per day for TSS, ammonia, and total phosphorus will adequately demonstrate plant operation and maintenance.

g) Effluent Annual Average Limitations and Monitoring, Outfall 001 – Nutrients

VPDES Regulation 9VAC25-31-220(D) requires effluent limitations that are protective of both the numerical and narrative water quality standards for state waters, including the Chesapeake Bay.

As discussed in Section 15, significant portions of the Chesapeake Bay and its tributaries are listed as impaired with nutrient enrichment cited as one of the primary causes. Virginia has committed to protecting and restoring the Bay and its tributaries. Only concentration limits are now found in the individual VPDES permit when the facility installs nutrient removal technology.

This facility has also obtained coverage under 9VAC25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia.* This regulation specifies and controls the nitrogen and phosphorus loadings from facilities and specifies facilities that must register under the general permit. Nutrient loadings for those facilities registered under the general permit as well as compliance schedules and other permit requirements, shall be authorized, monitored, limited, and otherwise regulated under the general permit and not this individual permit. This facility has coverage under this General Permit; the permit number is VAN010022. Total Nitrogen Annual Loads and Total Phosphorus Annual Loads from this facility are found in 9VAC25-720 – *Water Quality Management Plan Regulation* which sets forth TN and TP maximum wasteload allocations for facilities designated as significant discharges, i.e., those with design flows of $\geq$0.5 MGD above the fall line and $\geq$0.1 MGD below the fall line.

Monitoring for TKN and Nitrates + Nitrites is included in this permit. Total Nitrogen has a concentration effluent limitation of 7 mg/L. This Total Nitrogen effluent limitation was derived from the document entitled "To 1 Task 5 Development of the Nutrient Reduction Program at the Noman Cole PCP – Preliminary Engineering Report" dated June 2006. This PER states that "Consistent with the original design, the current reliable treatment limit at the NCPCP, after the addition of the methanol facility, at the design flows is estimated to be 7.0 mg/L Total Nitrogen." The Certificate to Operate the methanol feed system was issued on July 30, 2008. Therefore, a concentration effluent limitation of 7 mg/L was established in this permit reissuance.

Noman M. Cole is continuing to upgrade their Total Nitrogen removal efficiency so that they will be able to meet an effluent annual concentration of 3.0 mg/L It is expected that the technology will be installed to meet the 3.0 mg/L by the end of October 2013. Therefore, the permit is being drafted to contain an additional effluent page containing an annual Total Nitrogen concentration of 3.0 mg/L. This effluent limitation will become effective January 1st of the year after issuance of the Certificate to Operate for the installation of nutrient technology.

Annual average effluent limitations, as well as monthly and year to date calculations for Total Nitrogen are included in this individual permit. Since the Total Phosphorus effluent limitations both for monthly and weekly averages concentrations and poundages established by the PPRE is more stringent than what is required under 9VAC25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia*, it is the staff's best professional judgment to eliminate the need for requiring the permittee to provide the calculated "Year to Date" and "Calendar Year" values.

For the 67.0 MGD flow, concentration limits of 7.0 mg/L TN annual average and 0.3 mg/L TP annual average are needed based on 9VAC 25-40-70.A(4). As stated in Section 17c, the PPRE requires a TP concentration of 0.18 mg/L. The most stringent TP concentration was used to establish the TP effluent limitations.

18. Antibacksliding:

All limits in this permit are at least as stringent as those previously established. Backsliding does not apply to this reissuance.

The rest of this page is intentionally left blank.

19. A. Effluent Limitations/Monitoring Requirements:

Design flow of this facility is 67.0 MGD.
Effective Dates: During the period beginning with permit's effective date and lasting until December 31[st] of the year after the issuance of the Certificate to Operate for the installation of the nutrient removal technology or until the permit's expiration date, whichever occurs first.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS						MONITORING REQUIREMENTS	
		Monthly Average		Weekly Average		Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	67.0		NA		NA	NL	Continuous	TIRE
pH	3	NA		NA		6.0 S.U.	9.0 S.U.	1/D	Grab
$cBOD_5$	5, 6	5 mg/L	1268 kg/day	8 mg/L	2029 kg/day	NA	NA	3D/W	24 H-C
Total Suspended Solids (TSS)	6	6.0 mg/L	1522 kg/day	9.0 mg/L	2282 kg/day	NA	NA	1/D	24 H-C
Ammonia, as N (Apr-Oct)	6	1.0 mg/L	254 kg/day	1.5 mg/L	380 kg/day	NA	NA	1/D	24 H-C
Ammonia, as N (Nov-March)	3	2.2 mg/L		2.6 mg/L		NA	NA	1/D	24 H-C
Dissolved Oxygen	3, 5	NA		NA		6.0 mg/L	NA	1/D	Grab
Total Residual Chlorine (after contact tank)	4	NA		NA		0.5 mg/L	NA	12/D at 2H intervals	Grab
Total Residual Chlorine (after dechlorination)	3	0.008 mg/L		0.010 mg/L		NA	NA	12/D at 2H intervals	Grab
E. coli (Geometric Mean)	3	126 n/100 mls		NA		NA	NA	5D/W	Grab
Total Nitrogen[a,b]	1,3	NL		NA		NA	NA	3D/W	Calculated
TKN (mg/L)	1,3	NL		NA		NA	NA	3D/W	24 H-C
Nitrate + Nitrite, as N	1,3	NL		NA		NA	NA	3D/W	24 H-C
Total Nitrogen – Calendar Year[b]	1,3	7.0 mg/L		NA		NA	NA	1/YR	Calculated
Total Nitrogen – Year to Date[b] (mg/L)	1,3	NL		NA		NA	NA	1/M	Calculated
Total Phosphorus	5, 6	0.18 mg/L	46.6 kg/d	0.27 mg/L	68.5 kg/d	NA	NA	1/D	24 H-C
Chronic 3-Brood Static Renewal – *C. dubua* (TU_c)		NA		NA		NA	NL	1/YR	24 H-C
Chronic 7-Day Static Renewal – *P. promelas* (TU_c)		NA		NA		NA	NL	1/YR	24 H-C

The basis for the limitations codes are:
1. 9VAC25-40 (Nutrient Regulation)
2. Best Professional Judgment
3. Water Quality Standards
4. DEQ Disinfection Guidance
5. Stream Model- Attachment 11
6. 9VAC25-415 (Policy for the Potomac River Embayment)

MGD = Million gallons per day.
NA = Not applicable.
NL = No limit; monitor and report.
S.U. = Standard units.
TIRE = Totalizing, indicating and recording equipment.

12/D = Twelve times per day
1/D = Once every day.
3D/W = Three days a week.
5D/W = Five days a week.
1/M = Once every month.
1/YR = Once every year.

24H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the Monitored 24-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of twenty-four (24) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum of twenty-four (24) grab samples obtained at hourly or smaller intervals may be collected. Where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by ≥10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

[a] = Total Nitrogen = Sum TKN plus Nitrate + Nitrite

[b] = See Section 21.a. for the Nutrient Calculations.

19. B. Effluent Limitations/Monitoring Requirements:

Design flow of this facility is 67.0 MGD.
Effective Dates: During the period from January 1st of the year after the issuance of the Certificate to Operate for the installation of the nutrient technology and lasting until the permit's expiration date.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	67.0	NA	NA	NL	Continuous	TIRE
pH	3	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
$cBOD_5$	5, 6	5 mg/L 1268 kg/day	8 mg/L 2029 kg/day	NA	NA	3D/W	24 H-C
Total Suspended Solids (TSS)	6	6.0 mg/L 1522 kg/day	9.0 mg/L 2282 kg/day	NA	NA	1/D	24 H-C
Ammonia, as N (Apr-Oct)	6	1.0 mg/L 254 kg/day	1.5 mg/L 380 kg/day	NA	NA	1/D	24 H-C
Ammonia, as N (Nov-March)	3	2.2 mg/L	2.6 mg/L	NA	NA	1/D	24 H-C
Dissolved Oxygen	3, 5	NA	NA	6.0 mg/L	NA	1/D	Grab
Total Residual Chlorine (after contact tank)	4	NA	NA	0.5 mg/L	NA	12/D at 2H intervals	Grab
Total Residual Chlorine (after dechlorination)	3	0.008 mg/L	0.010 mg/L	NA	NA	12/D at 2H intervals	Grab
E. coli (Geometric Mean)	3	126 n/100 mls	NA	NA	NA	5D/W	Grab
Total Nitrogen[a,b]	1,3	NL	NA	NA	NA	3D/W	Calculated
TKN (mg/L)	1,3	NL	NA	NA	NA	3D/W	24 H-C
Nitrate + Nitrite, as N	1,3	NL	NA	NA	NA	3D/W	24 H-C
Total Nitrogen – Calendar Year[b]	1,3	3.0 mg/L	NA	NA	NA	1/YR	Calculated
Total Nitrogen – Year to Date[b] (mg/L)	1,3	NL	NA	NA	NA	1/M	Calculated
Total Phosphorus	5, 6	0.18 mg/L 46.6 kg/d	0.27 mg/L 68.5 kg/d	NA	NA	1/D	24 H-C
Chronic 3-Brood Static Renewal – *C. dubua* (TU_c)		NA	NA	NA	NL	1/YR	24 H-C
Chronic 7-Day Static Renewal – *P. promelas* (TU_c)		NA	NA	NA	NL	1/YR	24 H-C

The basis for the limitations codes are:

1. 9VAC25-40 (Nutrient Regulation)
2. Best Professional Judgment
3. Water Quality Standards
4. DEQ Disinfection Guidance
5. Stream Model- Attachment 11
6. 9VAC25-415 (Policy for the Potomac River Embayment)

MGD = Million gallons per day.
NA = Not applicable.
NL = No limit; monitor and report.
S.U. = Standard units.
TIRE = Totalizing, indicating and recording equipment.

12/D = Twelve times per day
1/D = Once every day.
3D/W = Three days a week.
5D/W = Five days a week.
1/M = Once every month.
1/YR = Once every year.

24H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the Monitored 24-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of twenty-four (24) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum of twenty-four (24) grab samples obtained at hourly or smaller intervals may be collected. Where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by ≥10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

[a] = Total Nitrogen = Sum TKN plus Nitrate + Nitrite

[b] = See Section 21.a. for the Nutrient Calculations.

20. Sludge Monitoring and Limitations:

a) Regulations:

The VPDES Permit Regulation (VAC 25-31-10 et seq.), has incorporated technical standards for the use or disposal of sewage sludge, specifically land application and surface disposal, promulgated under 40 CFR Part 503. The Permit Regulation (9VAC25-31-420) establishes the standards for the use or disposal of sewage sludge. This part establishes standards, which consist of general requirements, pollutant limits, management practices, and operational standards, for the final use or disposal of sewage sludge generated during the treatment of domestic sewage in the treatment works.

b) Evaluations:

Sludge Classification:
The Noman M. Cole PCP is considered as Class I sludge management facility. The permit regulation (9VAC25-31-500) defines a Class I sludge management facility as any POTW which is required to have an approved pretreatment program defined under Part VII of the VPDES Permit Regulation (9VAC25-31-730 to 900) and/or any treatment works treating domestic sewage sludge that has been classified as a Class I facility by the Board because of the potential for its sewage sludge use or disposal practice to adversely affect public health and the environment. The Noman M. Cole PCP incinerates the sludge generated from the wastewater treatment process. Incineration is governed by the regulations of the Air Pollution Control Board. The ash generated from the incinerators is disposed in a landfill.

21. Other Permit Requirements:

a) Part 1.B. of the permit contains additional chlorine monitoring requirements, quantification levels and compliance reporting instructions.

In accordance with VDH's Disinfection Guidelines and Requirements, a minimum chlorine residual must be maintained at the exit of the chlorine contact tank. As stated in VA-VDH's January 6, 1997 Working Memo from C.M. Sawyer, P.E., no more that 10% of the monthly test results for TRC at the exit of the chlorine contact tank shall be <1.0 mg/L with any TRC <0.6 mg/L considered a system failure. Variance from these requirements are allowed where the discharger provides adequate indicator microorganism test results for the effluent that verify disinfection standards were met during the TRC violations. *E. coli* limits are defined in this section as well as monitoring requirements to take effect should an alternate means of disinfection be used. Noman M. Cole PCP has been allowed a minimum chlorine contact value of 0.5 mg/L since the fecal coliform values have demonstrated that disinfection standards were met.

9VAC25-31-190.L.4.c. requires an arithmetic mean for measurement averaging and 9VAC25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Specific analytical methodologies for toxics are listed in this permit section as well as quantification levels (QLs) necessary to demonstrate compliance with applicable permit limitations or for use in future evaluations to determine if the pollutant has reasonable potential to cause or contribute to a violation. Required averaging methodologies are also specified.

The calculations for the Nitrogen parameters shall be in accordance with the calculations set forth in 9VAC25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia*. §62.1-44.19:13 of the Code of Virginia defines how annual nutrient loads are to be calculated; this is carried forward in 9VAC25-820-70. As annual concentrations (as opposed to loads) are limited in the individual permit, these reporting calculations are intended to reconcile the reporting calculations between the permit programs, as the permittee is collecting a single set of samples for the purpose of ascertaining compliance with two permits.

b) Permit Section Part I.C., details the requirements of a Pretreatment Program.

The VPDES Permit Regulation at 9VAC25-31-210 requires monitoring and reporting. The VPDES Permit Regulation at 9VAC25-31-730. through 900., and 40 CFR Part 403 requires POTWs with a design flow of >5 MGD and receiving from Industrial Users (IUs) pollutants which pass through or interfere with the operation of the POTW or are otherwise subject to pretreatment standards to develop a pretreatment program.

This treatment works is a POTW with a design capacity of 67 MGD. The Pretreatment Program was originally approved April 11, 1985 and was modified effective March 15, 1994 (legal authority, permit boilerplate, local limits, and Enforcement Response Plan). Fairfax County has five (5) Significant Industrial Users (SIUs) regulated through this program. Two of the SIUs are Categorical Industrial Users (CIUs): Alexandria Coatings (d.b.a. Alexandria Metal Finishers, Inc.) and TekAm Corporation. Both of these CIUs are metal finishers and are subject to categorical pretreatment standards and local limits. The three other SIUs are non-categorical and include Covanta Fairfax, Inc. (formerly Ogden Martin Systems/I-95 Resource Recovery Facility), Lorton CDD Landfill, Furnace Associates, EnviroSolutions, and Shenandoah's Pride Dairy.

The pretreatment program conditions will include: implementation of the approved pretreatment program that complies with the Clean Water Act, Water Control Law, State regulations and the approved program; submission to the Northern Regional Office of an annual report, by January 31st of each year, that describes the permittee's program activities over the previous year; submission of a survey of all the Industrial Users discharging to the POTW within 180 days of the permit's effective date; submission of any program changes prior to implementation; issuance and reissuance of all SIU permits in a timely manner, inspection and sampling of all SIUs annually, implementation of the reporting requirement of Part VII of the VPDES Permit Regulation; review of the Enforcement Response Plan; reevaluation of the local limits within one year of the permit's effective date; maintenance of adequate resources to implement the approved program; and meet all public participation and public notice requirements. The permit also contains a reopener clause.

c) Permit Section Part I.D., details the requirements for Whole Effluent Toxicity (WET) Program.

The VPDES Permit Regulation at 9VAC25-31-210 requires monitoring and 9VAC25-31-220.I, requires limitations in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act. A Whole Effluent Toxicity is imposed for municipal facilities with a design rate >1.0 MGD, with an approved pretreatment program or required to develop a pretreatment program, or those determined by the Board based on effluent variability, compliance history, IWC, and receiving stream characteristics.

Noman M. Cole PCP meets two of the above requirements, it is a POTW with a design rate >1.0 MGD and the facility has an approved pretreatment program. The WET uses bioassay-testing methods for measuring the potential for the effluent to cause toxicity in the receiving stream.

During the current permit cycle the facility was required to monitor the effluent on a yearly for chronic toxicity utilizing two test species. A toxicity testing summary for 1998 through 2012 can be found in Attachment 12. For all these tests, the effluent from Outfall 001 exhibited no toxicity since 1998 to the test organisms. The spreadsheet for determining the WET test endpoints can be found in Attachment 12.

The proposed permit includes TMP language that continues to require Noman M. Cole PCP to perform annual chronic toxicity testing for the duration of the permit. Results will be reported annually on the DMR.

22. Other Special Conditions:

a) 95% Capacity Reopener.
The VPDES Permit Regulation at 9VAC25-31-200.B.4 requires all POTWs and PVOTWs develop and submit a plan of action to DEQ when the monthly average influent flow to their sewage treatment plant reaches 95% or more of the design capacity authorized in the permit for each month of any three consecutive month period. This facility is a POTW.

b) Indirect Dischargers.
Required by VPDES Permit Regulation, 9VAC25-31-200 B.1 and B.2 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

c) O&M Manual Requirement.
Required by Code of Virginia §62.1-44.19; Sewage Collection and Treatment Regulations, 9VAC25-790; VPDES Permit Regulation, 9VAC25-31-190.E. The permittee shall maintain a current Operations and Maintenance (O&M) Manual. The permittee shall operate the treatment works in accordance with the O&M Manual and shall make the O&M Manual available to Department personnel for review upon request. Any changes in the practices and procedures followed by the permittee shall be documented in the O&M Manual within 90 days of the effective date of the changes. Non-compliance with the O&M Manual shall be deemed a violation of the permit.

d) CTC, CTO Requirement.
The Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9VAC25-790 requires that all treatment works treating wastewater obtain a Certificate to Construct prior to commencing construction and to obtain a Certificate to Operate prior to commencing operation of the treatment works.

e) Licensed Operator Requirement.
The Code of Virginia at §54.1-2300 et seq. and the VPDES Permit Regulation at 9VAC25-31-200 C, and Rules and Regulations for Waterworks and Wastewater Works Operators (18VAC160-20-10 et seq.) requires licensure of operators. This facility requires a Class I operator.

f) Reliability Class.
The Sewage Collection and Treatment Regulations at 9VAC25-790 require sewage treatment works to achieve a certain level of reliability in order to protect water quality and public health consequences in the event of component or system failure. Reliability means a measure of the ability of the treatment works to perform its designated function without failure or interruption of service. The facility is required to meet a reliability Class of I.

g) Sludge Reopener.
The VPDES Permit Regulation at 9VAC25-31-220.C. requires all permits issued to treatment works treating domestic sewage (including sludge-only facilities) include a reopener clause allowing incorporation of any applicable standard for sewage sludge use or disposal promulgated under Section 405(d) of the CWA. The facility includes a sewage treatment works.

h) Sludge Use and Disposal.
The VPDES Permit Regulation at 9VAC25-31-100.P; 220.B.2., and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on their sludge use and disposal practices and to meet specified standards for sludge use and disposal. The facility includes a treatment works treating domestic sewage.

i) E3/E4.
9VAC25-40-70 B authorizes DEQ to approve an alternate compliance method to the technology-based effluent concentration limitations as required by subsection A of this section. Such alternate compliance method shall be incorporated into the permit of an Exemplary Environmental Enterprise (E3) facility or an Extraordinary Environmental Enterprise (E4) facility to allow the suspension of applicable technology-based effluent concentration limitations during the period the E3 or E4 facility has a fully implemented

environmental management system that includes operation of installed nutrient removal technologies at the treatment efficiency levels for which they were designed.

j) Nutrient Reopener.
9VAC25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. 9VAC25-31-390 A authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.

k) Nutrient Offsets.
The Virginia General Assembly, in their 2005 session, enacted a new Article 4.02 (Chesapeake Bay Watershed Nutrient Credit Exchange Program) to the Code of Virginia to address nutrient loads to the Bay. Section 62.1-44.19:15 sets forth the requirements for new and expanded dischargers, which are captured by the requirements of the law, including the requirement that non-point load reductions acquired for the purpose of offsetting nutrient discharges be enforced through the individual VPDES permit.

l) PCB Monitoring.
This special condition requires the permittee, upon notification from DEQ-NRO, to submit a Pollutant Minimization Plan (PMP) to identify known and unknown sources of low-level PCBs in the effluent. This special condition details the contents of the PMP and also requires an annual report on progress to identify sources.

m) TMDL Reopener.
This special condition is to allow the permit to reopened if necessary to bring it in compliance with any applicable TMDL that may be developed and approved for the receiving stream.

23. Permit Section Part II.

Part II of the permit contains standard conditions that appear in all VPDES Permits. In general, these standard conditions address the responsibilities of the permittee, reporting requirements, testing procedures and records retention.

24. Permit Section Part III.

Part III of the permit implements the standards, monitoring and technical requirements of the 6.6 MGD reclamation and reuse of the 67.0 MGD facility.

a) Reclaimed Water Standards and Monitoring Summary:
The Level 1 for the industrial, irrigation (unrestricted access) and construction categories reclaimed water standards and monitoring requirements for Outfall 650 are presented in the following table. Outfall 650 sampling location is designated as after all reclaimed water treatment units and prior to the discharge to the reclaimed water distribution system. Parameters to be sampled at Outfall 650 are *E.coli*, TRC, Turbidity, and pH. Parameters to be sampled at Outfall 001 location are $cBOD_{5,}$ Total Nitrogen, and Total Phosphorus.

The rest of this page is intentionally left blank.

During the period beginning with the permit's effective date ending with the permit expiration date, the permittee is required to monitor pollutants in the reclaimed water as described below for reuses specified in the Reclaimed Water Management Plan:

Parameter	Standard (1)	Units	Frequency	Sample Type
E. coli (2)	Geometric mean (3): ≤ 11	Colonies/100 ml	5D/ W (4)	Grab
	CAT: 35	Colonies/100 ml	NA	Grab
Total Residual Chlorine (TRC) (5)	NL	mg/L	Continuous	Recorded
	CAT: < 0.5	mg/L	Continuous	Recorded
pH (6)	6.0 – 9.0	Standard Units	1/D	Grab
$cBOD_5$	Monthly average: ≤ 5	mg/L	3D/*W*	24 HC
Turbidity (7)	Daily average (8): ≤ 2	NTU	Continuous	Recorded
	CAT: > 5	NTU	Continuous	Recorded
Reclamation System Flow (9)	Monthly average: NL	MGD	Continuous	TIRE
	Monthly maximum: NL	MGD	Continuous	TIRE
Influent Flow (10)	Monthly average: NL	MGD	Continuous	TIRE(11)
	Monthly maximum: NL	MGD	Continuous	TIRE (11)
Total Nitrogen (12)	NL	mg/L	3D/W	24 HC
Total Phosphorus (12)	NL	mg/L	3D/W	24 HC

NA = Not Applicable
CAT = Corrective action threshold
MGD = Million gallons per day
3D/W = Three days per week
5D/W = Five days per week

NL = No Limit
NTU = nephelometric turbidity unit
TIRE = Totalizing, indicating, and recording equipment
1/D = Once per day

24H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the monitored 24-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of twenty-four (24) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum of twenty-four (24) grab samples obtained at hourly or smaller intervals may be collected where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by 10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

(1) With the exception of turbidity and TRC, standards must be met at the point of compliance (POC) designated as internal outfall 650. The POC shall be just upstream of disinfection for turbidity, at the end contact period for total residual chlorine, and as specified in the approved operations and maintenance manual of the reclamation system for all other standards
(2) After disinfection.
(3) For the purpose of calculating the geometric mean, bacterial analytical results below the detection level of the analytical method used shall be reported as values equal to the detection level.
(4) For reclamation systems treating municipal wastewater, bacterial samples shall be collected between 10:00 a.m. and 4:00 p.m. to coincide with peak flows to the reclamation system.
(5) The TRC standard applies only if chlorine is used for disinfection. TRC is measured after a minimum contact time of 30 minutes at average flow or 20 minutes at peak flow.
(6) A pH meter shall be used for all pH analysis of reclaimed water.
(7) Turbidity analysis shall be performed by a continuous, on-line turbidity meter equipped with an automated data logging or recording device and an alarm to notify the operator when the CAT for turbidity in the standard for Level 1 has been reached. Compliance with the average turbidity standard shall be determined daily, based on the arithmetic mean of hourly or more frequent discrete measurements recorded during a 24-hour period. See Part III.B.5 for additional information regarding turbidity monitoring.
(8) Daily average is the arithmetic mean of hourly or more frequent discrete turbidity measurements recorded during a 24-hour period.
(9) The designated design capacity for the reclamation system is 6.6 MGD.
(10) The design capacity of the wastewater treatment works that will divert source water or effluent to the reclamation system is 67 MGD.
(11) Influent flow shall be monitored at the Reclamation and Reuse flow meter prior to the chlorine contact pipe.
(12) There shall be no nutrient management requirements for irrigation reuse of the reclaimed water provided by the reclaimed water distribution system based on an annual average concentration of total nitrogen (N) and monthly average concentration of total phosphorus (P) ≤ 8.0 and ≤ 1.0 mg/L, respectively. Annual average concentrations of total N shall be the arithmetic mean of the monthly average concentrations of these nutrients for the most recent 12 consecutive months of monitoring.

b) <u>Total Residual Chorine Variance:</u>

In accordance with VDH's Disinfection Guidelines and Requirements, a minimum chlorine residual must be maintained at the exit of the chlorine contact tank. As stated in VA-VDH's January 6, 1997 Working Memo from C.M. Sawyer, P.E., no more that 10% of the monthly test results for TRC at the exit of the chlorine contact tank shall be <1.0 mg/L with any TRC <0.6 mg/L considered a system failure. Variance from these requirements are allowed where the discharger provides adequate indicator microorganism test results for the effluent that verify disinfection standards were met during the TRC violations. Noman M. Cole PCP has been allowed a minimum chlorine contact value of 0.5 mg/L since the fecal coliform values have demonstrated that disinfection standards were met.

c) $cBOD_5$ Monthly Average Basis:
The $cBOD_5$ monthly average concentration is 5 mg/L and is based on the Policy for the Potomac River Embayments (9VAC25-415-10 *et seq*.).

d) Sample Types and Monitoring Frequency:
Sample type and monitoring frequency for $cBOD_5$, *E.coli*, Total Nitrogen and Total Phosphorus are consistent with the VPDES permit effluent requirements in Part I.A of this permit. All other sample type and monitoring frequency requirements are in accordance with the recommendations in the Water Reclamation and Reuse Regulation (9VAC25 740-10 *et seq.).*

25. Other Reclamation and Reuse Special Conditions:

a) Part III. B. – Nos. 1- 3.
These special conditions outline prohibition uses (9VAC25-740-50.B), nuisance conditions (9VAC25 740-170.D), and reclamation and reuse permit reopener clause. It is staff's best professional judgment that the permit contain this reopener allowing the Board to modify or revoke and reissue this permit if any applicable standards or requirements for water reclamation and reuse promulgated under the Water Reclamation and Reuse Regulation (9VAC25 740) are more stringent than or are in addition to any standards or requirements for water reclamation and reuse contained in this permit.

b) Part III.B. – Nos. 4-12.
These special conditions outline the requirements for submitting monthly monitoring reports based on the Water Reclamation and Reuse Regulation (9VAC25-740-80.C).

The Corrective Action Threshold (CAT) are specified for Turbidity, Total Residual Chlorine and *E. coli* and the procedure for the corrective action as stated in the Water Reclamation and Reuse Regulation (9VAC25-740-70.C.1 and 9VAC25-740-70.C.2).

Special condition that states failure to resample Turbidity, Total Residual Chlorine and *E. coli* to ensure compliance with the CAT is a violation of this permit as specified in the Water Reuse and Reclamation Regulation (9VAC25-740-70.C.3).

Special condition for the online turbidity meter that requires manual samples be collected at four-hour intervals up to a maximum of five days should the continuous turbidity meter is out of service for either planned or unplanned repair in accordance with 9VAC25-740-80.A.1.

Special condition requiring a Class I licensed operator for the reclamation system in accordance with 9VAC25-740-130.A.

Special condition for the submittal of the updated Operation and Maintenance Manual for the reclamation and reuse system of the Noman M. Cole, Jr. Pollution Control Plant within 90 days of placing the reclamation and reuse system into operation to DEQ-NRO in accordance with Water Reclamation and Reuse Regulation 9VAC25-740-120.B. f., 9VAC25-740-140.A. and 9VAC25-740-140.D.1 and F.

Special condition regarding 95% capacity reopener requires that when the reclamation system reaches 95% of the designated design capacity authorized by this permit for each month of any 3 consecutive month period, a written notice and plan of action for ensuring continued compliance with the terms of this permit shall be submitted to DEQ-NRO in accordance with the Water Reclamation and Reuse Regulation 9VAC25-740-180.

Special condition regarding the BNR reopener is based on the staff's best professional judgment that when the total nitrogen (N) or total phosphorus (P) in the reclaimed water exceeds 8.0 mg/L or 1.0 mg/L, respectively, for the preceding calendar year (January through December), a written notice of such nutrient reduction failure and a plan of action for ensuring the reclamation system achieves BNR treatment of the reclaimed water shall be submitted by the permittee to the DEQ-NRO for review and approval. This condition, although not specifically stated in the law or regulation, is intended to address those situations where the pemittee's reclamation system is unable to produce BNR reclaimed water as indicated by their permit application, and the additional nutrient in the non-BNR reclaimed water consequently unmanaged for irrigation reuses. The permittee has the option to correct treatment of the reclaimed water to achieve BNR or in the absence of action, face possible enforcement action that may ultimately result in a staff initiated modification of the permit to add nutrient management requirements for irrigation reuse of the non-BNR reclaimed water.

Special condition regarding the permittee's authorization to treat reclaimed water to Level I due to the facility's pretreatment program approval in accordance with Part VII of the VPDES Permit Regulation (9VAC25-31-730 through 9VAC25-31-900. This is in accordance with the Water Reclamation and Reuse Regulation (9VAC25-740-150.A.).

c) Part III.B. – Nos. 13 – 14.
Special condition regarding the use of tank trucks are in accordance with the Water Reclamation and Reuse Regulation (9VAC25-740-110.B.7).

Special condition that requires the maintenance of the reclaimed water distribution system to minimize losses and to ensure safe and reliable conveyance of reclaimed water in accordance with Water Reclamation and Reuse Regulation (9VAC25-740-110.B.9 and 9VAC25-740-100.C.1.a.).

d) Part III. B. - No. 15.
Special conditions requiring an operations and maintenance manual for the reclaimed water distribution system in accordance with 9VAC25-640-140 B, D.2, and F and 9VAC25-740-110. B.9.

e) Part III.B. - Nos. 16 – 17.
Special condition regarding the reject and reclaimed water storage design and operation to prevent a discharge to surface waters of the state except in the event of a storm greater that 25-year 24-storm in accordance with the Water Reclamation and Reuse Regulation (9VAC25-740-110 C.14).

Special condition requiring the current inventory of the reject water storage, system storage and non-system storage facilities located within the service area of the approved RWM plan in accordance with the Water Reclamation and Reuse Regulation (9VAC25-740-110 C. 15).

f) Part III. B. Nos. 18 – 19.
Special conditions requiring the permittee to comply with submittal of preliminary engineering reports, Certificates to Construct, and Certificates to Operate for the Reclamation and Reuse project in accordance with the Water Reclamation and Water Reuse Regulation (9VAC25-740-120.A. and 9VAC25-740-120 B. 1).

g) Part III. B. Nos. 20 – 23.
Special conditions require no uncontrolled public access to the reclamation system, advisory signs for all Level 1 reclaimed water reuses, and the placement of advisory signs around areas of industrial sites where reclaimed water is used in accordance with the Water Reclamation and Reuse Regulation (9VAC25-740-160).

h) Part III. B. Nos. 24 – 30.
Special conditions require the daily calculation of the rate of the supplemental irrigation for the maximization of production or optimization of growth of the irrigated vegetation, the control of salts so that the irrigated vegetation is not adversely effected; the conditions for irrigating the vegetation; the setback distances for various wells, limestone rock outcrops; dwellings; and the method of measurement for the setbacks in accordance with the Water Reclamation and Reuse Regulation (9VAC25-740-10; 9VAC25-740-100.C.2; 9VAC25-740-170.G; 9VAC25-740-170.H.1, 2, 5, and 6).

i) Part III. B. No. 31.
Special conditions that govern the setback distances maintained from indoor aesthetic features and setback distance from open cooling towers are in accordance with the Water Reclamation and Reuse Regulation (9VAC25 -740-170.J and K).

j) Part III. B. Nos. 32 – 36**.**
Special conditions that require the permittee to notify the end users if the reclaimed water fails more than once

during a seven-day period to comply with Level 1 disinfection; the permittee to submit new end users to DEQ-NRO within 30 days of connection to the reclaimed water service; the permittee to report each interruption or loss of reclaimed water supply to DEQ-NRO; the permittee to maintain water reclaim records as specified in Part II.B of the permit; the permittee to submit annual reports for the reclaimed water distribution system covering a 12-month period from January 1 through December 31 to the DEQ-NRO on or before February 10th of the following year in accordance with the Water Reclamation and Reuse Regulation (9VAC25-740-100.C1.f and 8; 9VAC25-740-170.A.2; 9VAC25-740-200.B and C; 9VAC25-740-190.A and B).

26. Changes to the Permit from the Previously Issued Permit:

Special Conditions:
1) Reclamation and Reuse special conditions were incorporated into the draft permit.

Monitoring and Effluent Limitations:
1) Total Residual Chlorine monitoring after dechlorination was increased in accordance with the VPDES Permit Manual recommended monitoring frequencies.
2) Reclamation and Reuse monitoring and effluent limitations were incorporated into the draft permit.
3) Corrected the typographical error for the Ammonia (November – March) weekly maximum from 2.7 mg/L to 2.6 mg/L. (See Attachment 9).
4) Changed the frequency of analysis for Total Residual Chlorine from once per day to twelve times per day in accordance with the Permit Manual.
5) Changed the reporting of the Total Phosphorus loadings from pounds per day to kilograms per day.
6) Updated the PCB Monitoring to require a submittal of a Pollutant Minimization Plan (PMP) when notified by DEQ.
7) Removed the Water Quality Criteria Reopener Special Condition.
8) Removed the Final Effluent Monitoring Alternative Special Condition.

27. Variances/Alternate Limits or Conditions:

The Noman M. Cole PCP has a variance from EPA for the analysis of Total Phosphorus. The on-site laboratory utilizes the stannous chloride method (Standard Methods, 14th edition, Method 425E). (Attachment 13)

28. Public Notice Information:

First Public Notice Date: Second Public Notice Date:

Public Notice Information is required by 9VAC25-31-280 B. All pertinent information is on file and may be inspected, and copied by contacting the: DEQ Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193, Telephone No. (703) 583-3925, joan.crowther@deq.virginia.gov. See Attachment 14 for a copy of the public notice document.

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer and of all persons represented by the commenter/requester, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit. Requests for public hearings shall state 1) the reason why a hearing is requested; 2) a brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit; and 3) specific references, where possible, to terms and conditions of the permit with suggested revisions. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given. The public may request an electronic copy of the draft permit and fact sheet or review the draft permit and application at the DEQ Northern Regional Office by appointment.

29. Additional Comments:

Previous Board Action: A Consent Order was issued on April 5, 2012, between the State Water Control Board and the Fairfax County Board of Supervisors, regarding the Noman M. Cole, Jr. Pollution Control Plant for the purpose of resolving violations of the State Water Control Law and the applicable Permit and Regulation. Between the period of December 2010 and June 2011, seven incidents of either raw sewage, tertiary clarifier sludge, or septage was discharged into state waters. Fairfax County Board of Supervisors agreed to pay a civil charge of $15,015.00 in settlement of the violations cited in the Consent Order. This Consent Order was terminated on April 18, 2012 after payment was received.

Staff Comments:

Public Comment: 1) By letter dated May 31, 2013, DCR stated that no state threatened or endangered species were in the project vicinity.

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
Water Quality Assessments and Planning
629 E. Main Street P.O. Box 10009 Richmond, Virginia 23240

SUBJECT: Flow Frequency Determination
Lower Potomac STP - VA#0025364

RECEIVED
JAN 3 1997
Northern VA. Region
Dept. of Env. Quality

TO: April Young, NRO

FROM: Paul Herman, WQAP Paul

DATE: December 31, 1996

COPIES: Ron Gregory, Charles Martin, File

The Lower Potomac STP discharges to the Pohick Creek near Lorton, VA. Stream flow frequencies are required at this site for use by the permit ~~writer in d~~eveloping effluent limitations for the VPDES permit. The Policy for the Potomac Embayments (PES) apply to this facility thereby requiring special flow frequency analyses to determine the 1Q10 and 7Q10 during the winter months (November - March) defined by the Standard. The 1Q10 and 7Q10 flow frequencies for the summer months (April - October) are based on the analysis of data available for the period of record at the selected reference gaging station.

The seasonal, temperature based, flow frequencies have been determined for the reference gage used in this analysis; the Accotink Creek near Annandale, VA (#01654000) which has been operated by VDEQ and the USGS since 1947. The gage is located at the Route 620 bridge in Fairfax County, VA. The flow frequencies for the gage and the discharge point are presented below. The values at the discharge point were determined by drainage area proportions and do not address any withdrawals, discharges, or springs lying upstream.

Accotink Creek near Annandale, VA (#01654000):

Drainage Area = 23.5 mi^2

1Q10 = 0.24 cfs	PES 1Q10 = 2.5 cfs	HF 30Q10 = 7.2 cfs
7Q10 = 0.51 cfs	PES 7Q10 = 3.4 cfs	LF 30Q10 = 1.5 cfs
30Q5 = 2.5 cfs	HM = 6.1 cfs	

Pohick Creek at Lower Potomac STP discharge point:

cfs × 0.6463 = MGD

Drainage Area = 32 mi^2

1Q10 = 0.33 cfs = 0.21 MGD	PES 1Q10 = 3.4 cfs = 2.2 MGD
7Q10 = 0.69 cfs = 0.44 MGD	PES 7Q10 = 4.6 cfs = 3.0 MGD
30Q5 = 3.4 cfs = 2.2 MGD	HM = 8.3 cfs = 5.4 MGD

HF 30Q10 = 9.8 cfs = 6.3 mgd
LF 30Q10 = 2.0 cfs = 1.3 mgd

QCC
7/21/08

Attachment 1

Be advised, the seasonal tiering defined in the Policy for Potomac Embayments is not based on stream flow. Rather, the tiers are temperature based. Procedures for establishing flows during the months included in a temperture tier are not addressed in Section III-A pages 12-17 of the "Virginia Water Control Board VPDES Technical Reference Manual".

If you have any questions concerning this analysis, please let me know.

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
Office of Water Resources Management

4900 Cox Road P. O. Box 11143 Richmond, Virginia 23230

SUBJECT: Flow Frequency Determination
Lower Potomac STP - VA#0025364

TO: Lyle Anne Collier, NRO

FROM: Paul Herman, OWRM-WQAP Paul

DATE: September 29, 1993

COPIES: Ron Gregory, Charles Martin, Dale Phillips, Curt Wells, Charlie Banks, File

The Lower Potomac STP discharges to Pohick Creek near Lorton, VA. Stream flow frequencies are required at this site for use by the permit writer in developing effluent limitations for the VPDES permit.

The DEQ has operated a continuous record gage on Accotink Creek near Annandale, VA (#01654000) since 1948. The gage is approximately 7.0 miles north of the discharge point. The flow frequencies for the gage and the discharge point are presented below. The values at the discharge point were determined by drainage area proportions and do not address any withdrawals, discharges, or springs lying upstream.

Accotink Creek near Annandale, VA (#01654000):

Drainage Area =	23.4	mi^2
1Q10 =	0.24	cfs
7Q10 =	0.51	cfs
High Flow 1Q10 =	3.7	cfs
High Flow 7Q10 =	4.5	cfs
30Q5 =	2.5	cfs
HM =	6.1	cfs

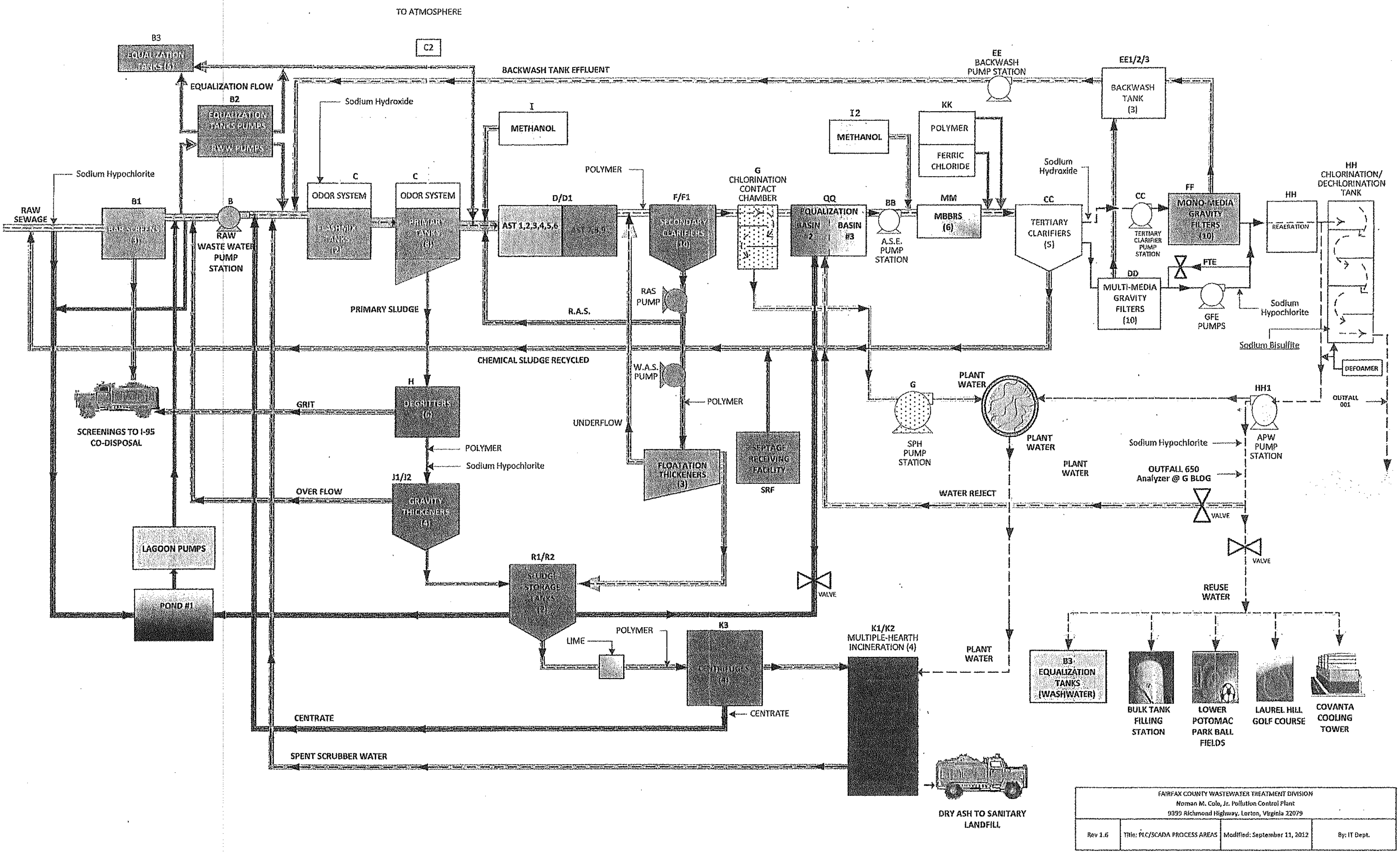
Pohick Creek at Lower Potomac STP discharge point:
cfs x 0.6463 = MGD

Drainage Area =	32	mi^2	
1Q10 =	0.33	cfs	= 0.21 MGD
7Q10 =	0.69	cfs	= 0.44 MGD
High Flow 1Q10 =	5.0	cfs	= 3.23 MGD December - May
High Flow 7Q10 =	6.1	cfs	= 3.94 MGD December - May
30Q5 =	3.4	cfs	= 2.2 MGD
HM =	8.3	cfs	= 5.4 MGD

If you have any questions concerning this analysis, please let me know.

10/1/93 - Per Paul Herman, the high flow months are December - May. Lac

WASTEWATER TREATMENT PROCESS AREAS



Attachment 2

Attachment 3

Chemical Tank Information

Chemical	CAS No.	Location	Tank No.	Tank Material	Tank Fill Volume (Gal.)	Total Volume of Tank (Gal.)	Total Vol. per Bldg. (Gal. unless noted otherwise)	Secondary Containment	Containment Area Drains To	Shutoff Procedure	Drawing Set No.
Ferric Chloride	7705-08-0	KK Bldg.	1	Fiberglass	9000	9000	44500	Yes	Head of the Plant	1/4 turn ball valve located outside the containment area	1
			2	Fiberglass	9000	9000		Yes	Head of the Plant	1/4 turn ball valve located outside the containment area	1
			3	Fiberglass	12000	12000		Yes	Head of the Plant	1/4 turn ball valve located at tank discharge	NA
			4	Fiberglass	14500	16000		Yes	Head of the Plant	1/4 turn ball valve located at tank discharge	NA
Sodium Hypochlorite	7681-52-9	G Bldg.	1	Fiberglass	10000	11000	40000	Yes	G building chlorine contact chamber	Diaphragm valve on tank discharge line	NA
			2	Fiberglass	10000	11000		Yes	G building chlorine contact chamber	Diaphragm valve on tank discharge line	NA
			3	Fiberglass	10000	11000		Yes	G building chlorine contact chamber	Diaphragm valve on tank discharge line	NA
			4	Fiberglass	10000	11000		Yes	G building chlorine contact chamber	Diaphragm valve on tank discharge line	NA
		S Bldg.	1	Fiberglass	16000	16000	16000	Yes	Head of the Plant	1/4 turn ball valve located at tank discharge	4
		C-2 Bldg.	1	Fiberglass	10000	10000	10000	Yes	Head of the Plant	Diaphragm valve at tank discharge	NA
		B-3 Bldg.	1	Fiberglass	500	500	500	Yes	Clean up in place	Diaphragm valve on tank discharge line	NA
		R1/R2 Bldg	1	Fiberglass	805	910	910	Yes	Primary effluent channel	1/4 turn ball valve at tank discharge	2
		HH Bldg.	1	Polyethelyne	1500	1500	4500	Yes	Clean up in place	1/4 turn ball valve at tank discharge	4
			2	Polyethelyne	1500	1500		Yes	Clean up in place	1/4 turn ball valve at tank discharge	4
			3	Polyethelyne	1500	1500		Yes	Clean up in place	1/4 turn ball valve at tank discharge	NA
		K-3 Bldg.	1	Fiberglass	200	200	200	Yes	Head of the Plant	1/4 turn ball valve on tank discharge line	3
Sodium Bisulfite	7631-90-5	PP Bldg.	1	Fiberglass	7500	7500	15000	Yes	Clean up in place	Diaphragm valve on tank discharge line	NA
			2	Fiberglass	7500	7500		Yes	Clean up in place	Diaphragm valve on tank discharge line	NA
		HH Bldg.	1	Fiberglass	1000	1000	1000	Yes	Clean up in place	Diaphragm valve on tank discharge line	NA
		HH Bldg.	1	Fiberglass	65	65	65	Yes	Clean up in place	1/4 turn ball valve on tank discharge line	NA

Chemical Tank Information

Chemical	CAS No.	Location	Tank No.	Tank Material	Tank Fill Volume (Gal.)	Total Volume of Tank (Gal.)	Total Vol. per Bldg. (Gal. unless noted otherwise)	Secondary Containment	Containment Area Drains To	Shutoff Procedure	Drawing Set No.
Sodium Hydroxide	1310-73-2	HH Bldg.	10	Drum	55	55	550	No	Clean up in place	NA	NA
		S Bldg.	1	Fiberglass	16000	16000	48000	Yes	Head of the Plant	Diaphragm valve at tank discharge	5
			2	Fiberglass	16000	16000		Yes	Head of the Plant	Diaphragm valve at tank discharge	5
			3	Fiberglass	16000	16000		Yes	Head of the Plant	Diaphragm valve at tank discharge	5
		C-2 Bldg.	1	Fiberglass	7000	7000	7000	Yes	Head of the Plant	Diaphragm valve at tank discharge	NA
		R1/R2 Bldg.	1	Polyethelyne	2000	2000	4000	Yes	Primary effluent channel	1/4 turn ball valve at tank discharge	6
			2	Polyethelyne	2000	2000		Yes	Primary effluent channel	1/4 turn ball valve at tank discharge	6
		K-3 Bldg.	1	Fiberglass	200	200	200	Yes	Head of the Plant	1/4 turn ball valve on tank discharge line	7
		PP Bldg.	1	Fiberglass	94	94	94	Yes	Clean up in place	Diaphragm valve at tank discharge	NA
Calcium Oxide (lime)	1305	K-3 Bldg.	1	Stainless Steel	380,000 lbs.	380,000 lbs.	380,000 lbs.	No	Clean up in place	NA	NA
		K-3 Bldg.	1	Concrete	4000	4000	8000				
		K-3 Bldg.	2	Concrete	4000	4000		No	Clean up in place	NA	NA
		K-3 Bldg.	10	Bags	50 lbs.	50 lbs.	500 lbs	Yes	Clean up in place	NA	NA
Hydrochloric Acid	7647-01-0	K-3 Bldg.	10	Drum	20	20	200	Yes	Clean up in place	NA	NA
		C-2 Bldg.	1	Fiberglass	1400	1400	1400	Yes	Head of the Plant	Diaphragm valve on tank discharge line	NA
Sulfuric Acid	7664-93-9	R1/R2 Bldg.	1	Fiberglass	400	400	400	Yes	Primary effluent channel	1/4 turn stainless steel ball valve located at tank discharge	NA
		K-3 Bldg.	1	Fiberglass	200	200	200	Yes	Head of the Plant	1/4 turn ball valve at tank discharge	8
#2 Diesel Fuel	68476	G-1 Bldg.	1	Double-walled Steel	6000	6000	6000	Yes	Clean up in place	Gate valve at top of tank	NA
		G-3 Bldg.	1	Double-walled Steel	6000	6000	6000	Yes	Clean up in place	Gate valve at top of tank	NA
		G-4 Bldg.	1	Double-walled Steel	6000	6000	6000	Yes	Clean up in place	Gate valve at top of tank	NA
		K-1/K-2 Bldg.	10	Double-walled Steel	12000	12000	24000	Yes	Clean up in place	Gate valve at top of tank	NA
			13	Double-walled Steel	12000	12000		Yes	Clean up in place	Gate valve at top of tank	NA

Chemical Tank Information

Chemical	CAS No.	Location	Tank No.	Tank Material	Tank Fill Volume (Gal.)	Total Volume of Tank (Gal.)	Total Vol. per Bldg. (Gal. unless noted otherwise)	Secondary Containment	Containment Area Drains To	Shutoff Procedure	Drawing Set No.
Hydraulic Oil (Waste)	64742-54-7	U Bldg.	1	Concrete Encased Steel	1000	1000	1000	Yes	Clean up in place	Gate valve at top of tank	NA
Methanol/Acetic Acid	67-56-1	I Bldg.	1	Stainless Steel	9000	9400	28200	Yes	Head of the Plant	Stainless steel gate valve located at tank discharge	9
			2	Stainless Steel	9000	9400		Yes	Head of the Plant	Stainless steel gate valve located at tank discharge	9
			3	Stainless Steel	9000	9400		Yes	Head of the Plant	Stainless steel gate valve located at tank discharge	9
P[illegible] Polymer		Q1 Bldg.	1	Fiberglass	6000	6000	6000	No	Clean up in place	1/4 turn ball valve at tank discharge	NA
		Q2 Bldg.	1	Fiberglass	6000	6000	6000	No	Clean up in place	1/4 turn ball valve at tank discharge	NA
Liquid Polymer		K-3 Bldg.	1	Fiberglass	7050	7050	7050	No	Clean up in place	1/4 turn ball valve at discharge of tank	10
Defoamer		HH Bldg.	5	Drum	55	55	275	No	Clean up in place	NA	NA
Polymer		S Bldg.	120	Bags	50 lbs.	50 lbs.	6000	No	Clean up in place	NA	NA
Polymer		J Bldg.	25	Bags	50 lbs.	50 lbs.	1250	No	Clean up in place	NA	NA
Polymer		K-3 Bldg.	1	Silo	6400	6400	6400	No	Clean up on place	NA	NA
Polymer		K-3 Bldg.	1	Silo	75000 lbs	75000lbs	75000 lbs	No	Clean up on place	NA	NA
Polymer		KK1 Bldg	120	Bags	50 lbs.	50 lbs.	6000	No	Clean up in place	NA	NA

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

NORTHERN REGIONAL OFFICE
13901 Crown Court, Woodbridge, Virginia 22193
(703) 583-3800 Fax (703) 583-3821
www.deq.virginia.gov

Douglas W. Domenech
Secretary of Natural Resources

David K. Paylor
Director

Thomas A. Faha
Regional Director

October 31, 2012

Mr. Michael McGrath
Director Wastewater Treatment Division
Fairfax County Public Works and Environmental Services
P.O. Box 268
Lorton, VA 22199-0268

Re: Noman M. Cole – Water Pollution Control Plant (WPCP) Inspection – VA0025364

Dear Mr. McGrath:

Attached is a copy of the Inspection Report generated while conducting a Facility Technical and Laboratory Inspection at the Noman M. Cole – Water Pollution Control Plant on September 25, 2012. This letter is not intended as a case decision under the Virginia Administrative Process Act, Va. Code § 2.2-4000 *et seq.* (APA). The compliance inspection staff would like to thank Mr. Mike McGrath and Chuck Longerbeam for their time and assistance during the inspection.

A summary for the technical inspection is enclosed. Please note the requirements and recommendations addressed in the technical summary. **A written response concerning the item listed in the Summary is due to this office by December 3, 2012.** Included in this response should be a plan of action and timetable for resolving these compliance issues, if they have not already been addressed. Your response may be sent either via the US Postal Service or electronically, via E-mail. If you choose to send your response electronically, we recommend sending it as an Acrobat PDF or in a Word-compatible, write-protected format. Additional inspections may be conducted to confirm the facility is in compliance with permit requirements.

If you have any questions or comments concerning this report, please feel free to contact me at the Northern Regional Office at (703) 583-3909 or by E-mail at Rebecca.Johnson@deq.virginia.gov.

Sincerely,

Rebecca J. Johnson

Rebecca Johnson
Environmental Specialist II

cc: Permit/DMR File;
cc electronic: Compliance Manager; Compliance Auditor

Attachment 4

DEQ
WASTEWATER FACILITY INSPECTION REPORT
PREFACE

VPDES/State Certification No.	(RE) Issuance Date	Amendment Date	Expiration Date
VA0025364	**09/29/2008**		**09/28/2013**

Facility Name	Address	Telephone Number
Noman Cole Jr. WPCP	**9399 Richmond Hwy** **Lorton, VA 22199**	**(703) 550-9740**
Owner Name	Address	Telephone Number
Fairfax County Board of Supervisors	**Same as above**	**(703) 550-9740**
Responsible Official	Title	Telephone Number
Mike McGrath	**Director**	**(703) 550-9740**
Responsible Operator	Operator Cert. Class/number	Telephone Number
Mike McGrath	**Class 1 - 1909001891**	**(703) 550-9740**

TYPE OF FACILITY:

DOMESTIC				**INDUSTRIAL**			
Federal		Major	**X**	Major		Primary	
Non-federal	**X**	Minor		Minor		Secondary	

INFLUENT CHARACTERISTICS:	DESIGN:
Flow	**67 MGD**
Population Served	**~500,000**
Connections Served	**~325,000**
BOD_5 (August 2012)	**182 mg/l**
TSS (August 2012)	**229 mg/l**

EFFLUENT LIMITS: Units in mg/L unless otherwise specified.

Parameter	Min.	Avg.	Max.	Parameter	Min.	Avg.	Max.
Flow (MGD)		**67**	**NL**	**Nitrate**		**NL**	
pH (s.u.)	**6**		**9**	**Total N**		**NL**	
DO	**6**			**Total Phosphorus**		**0.18**	**0.27**
CBOD5		**5**	**8**	**TSS**		**6**	**9**
NH3 (Apr-Oct)		**1.0**	**1.5**	**E. Coli (#/ 100 mL)**		**126**	
TKN		**NL**		**CL2 Res Max**		**0.008**	**0.010**

Receiving Stream	**Pohick Creek**
Basin	**Pototmac**
Discharge Point (LAT)	**38°41'54" N**
Discharge Point (LONG)	**77°12'04" W**

VPDES NO. **VA0025364**

REV 5/00

DEQ
WATER FACILITY
INSPECTION REPORT
PART 1

Inspection date:	**September 25, 2012**	Date form completed:	**October 31, 2012**
Inspection by:	**Rebecca Johnson**	Inspection agency:	**DEQ NRO**
Time spent:	**22 hours**	Announced: **No**	
Reviewed by:	**10/26/12**	Scheduled: **Yes**	

Present at inspection: **Mr. Mike McGrath and Mr. Chuck Longerbeam – Noman Cole**
Rebecca Johnson and Sharon Allen – DEQ

TYPE OF FACILITY:

	Domestic	**Industrial**	
[ ] Federal	[**X**] Major	[ ] Major	[ ] Primary
[**X**] Nonfederal	[ ] Minor	[ ] Minor	[ ] Secondary

Type of inspection:

[**X**] Routine
[ ] Compliance/Assistance/Complaint
[ ] Reinspection

Date of last inspection: **07/21/10**
Agency: **DEQ NRO**

Population served: approx. **500,000** Connections served: approx. **325,000**

Last month average: (Influent) **September 2012**

BOD_5	**167**	**mg/L**	Ammonia	**27.8**	**mg/L**	TKN	**40.6**	**mg/L**
TSS	**252**	**mg/L**	Total P	**5.6**	**mg/L**			

Last month average: (Effluent) Month/year: **September 2012**

Flow:	**34.7**	**MGD**	pH:	**6.8**	**S.U.**	TSS:	**1.2**	**mg/L**
DO	**6.9**	**mg/L**	TRC Final	**<QL**	**mg/L**	Total P	**0.07**	**mg/L**
TN	**3.19**	**mg/L**	Ammonia	**<QL**	**mg/L**	TKN	**0.66**	**mg/L**
$CBOD_5$	**<QL**	**mg/L**	E. Coli	**1**	**#/100mL**			

Quarter average: (Effluent): **July 2012, August 2012, and September 2012**

Flow:	**35.1**	**MGD**	pH:	**6.7**	**S.U.**	TSS:	**0.48**	**mg/L**
DO	**6.7**	**mg/L**	TRC Final	**0.3**	**mg/L**	Total P	**0.07**	**mg/L**
TN	**3.65**	**mg/L**	Ammonia	**0.01**	**mg/L**	TKN	**0.75**	**mg/L**
$CBOD_5$	**<QL**	**mg/L**	E. Coli	**1**	**#/100mL**			

DATA VERIFIED IN PREFACE [**X**] Updated [ ] No changes

Has there been any new construction? [**X**] Yes [ ] No

If yes, were plans and specifications approved? [**X**] Yes [ ] No [ ] NA

DEQ approval date: **CTC issued January and June 2010 (Mechanical Screens, Bioreactors, and Reuse Piping System. CTO issued December 2011 for Reuse Piping System.**

(A) PLANT OPERATION AND MAINTENANCE

1. Class and number of licensed operators: **12 Class I, 4 Class II, 16 Class III, 8 Class IV, 7 Trainees**
2. Hours per day plant is manned: **24 hours/7 days per week**
3. Describe adequacy of staffing. [**X**] Good [ ] Average [ ] Poor
4. Does the plant have an established program for training personnel? [**X**] Yes [ ] No
5. Describe the adequacy of the training program. [**X**] Good [ ] Average [ ] Poor
6. Are preventive maintenance tasks scheduled? [**X**] Yes [ ] No
7. Describe the adequacy of maintenance. [**X**] Good [ ] Average [ ] Poor*
8. Does the plant experience any organic/hydraulic overloading?
   If yes, identify cause and impact on plant: [**X**] Yes [ ] No
9. Any bypassing since last inspection? [ ] Yes [**X**] No
10. Is the standby electric generator operational? [**X**] Yes [ ] No* [ ] NA
11. Is the STP alarm system operational? [**X**] Yes [ ] No* [ ] NA
12. How often is the standby generator exercised? **At least once per month**
    Power Transfer Switch? **Per PM Schedule**
    Alarm System? **Per PM Schedule**
13. When was the cross connection control device last tested on the potable water service? **December 2011**
14. Is sludge being disposed in accordance with the approved sludge disposal plan?
    [**X**] Yes [ ] No [ ] NA
15. Is septage received by the facility? [**X**] Yes [ ] No
    Is septage loading controlled? [**X**] Yes [ ] No
    Are records maintained? [**X**] Yes [ ] No
16. Overall appearance of facility: [ ] Good [**X**] Average [ ] Poor

Comments:

8) **There is a 16 million gallon, grass lined emergency storage pond on plant grounds for raw influent. There are also 3 concrete basins on-site where excess flow can be pumped during wet weather events. By controlling the pump down rate of these basins, the excess hydraulic loading does not impact the downstream process units.**

10) **Dual power feed is primary back-up, generators are manually started if dual power fails. Generators tested monthly.**

12) **Mr. McGrath said the standby generator is going to be replaced in the next two years.**

(B) PLANT RECORDS

1. Which of the following records does the plant maintain?

Operational Logs for each unit process	[**X**] Yes	[ ] No	[ ] NA
Instrument maintenance and calibration	[**X**] Yes	[ ] No	[ ] NA
Mechanical equipment maintenance	[**X**] Yes	[ ] No	[ ] NA
Industrial waste contribution (Municipal Facilities)	[**X**] Yes	[ ] No	[ ] NA

2. What does the operational log contain?
   [**X**] Visual observations
   [**X**] Flow measurement
   [**X**] Laboratory results
   [**X**] Process adjustments
   [ ] Control calculations
   [ ] Other (specify)

Comments:

3. What do the mechanical equipment records contain?
   [**X**] As built plans and specs
   [**X**] Spare parts inventory
   [**X**] Manufacturers instructions
   [**X**] Equipment/parts suppliers
   [**X**] Lubrication schedules
   [ ] Other (specify)

Comments:

4. What do the industrial waste contribution records contain? (Municipal Only)
   [**X**] Waste characteristics
   [**X**] Locations and discharge types
   [**X**] Impact on plant
   [ ] Other (specify)

Comments:

5. Which of the following records are kept at the plant and available to personnel?
   [**X**] Equipment maintenance records
   [**X**] Operational Log
   [**X**] Industrial contributor records
   [**X**] Instrumentation records
   [**X**] Sampling and testing records

6. Records not normally available to plant personnel and their location: **None**

7. Were the records reviewed during the inspection? [**X**] Yes [ ] No

8. Are the records adequate and the O & M Manual current? [**X**] Yes [ ] No

9. Are the records maintained for the required 3-year time period? [**X**] Yes [ ] No

Comments:
8) O&M Manuals are in the process of being updated. The facility is installing new unit processes and upgrading existing unit processes.

(C) SAMPLING

1. Do sampling locations appear to be capable of providing representative samples? [X] Yes [ ] No*
2. Do sample types correspond to those required by the VPDES permit? [X] Yes [ ] No*
3. Do sampling frequencies correspond to those required by the VPDES permit? [X] Yes [ ] No*
4. Are composite samples collected in proportion to flow? [X] Yes [ ] No* [ ] NA
5. Are composite samples refrigerated during collection? [X] Yes [ ] No* [ ] NA
6. Does plant maintain required records of sampling? [X] Yes [ ] No*
7. Does plant run operational control tests? [X] Yes [ ] No

Comments:

(D) TESTING

1. Who performs the testing? [X] Plant [ ] Central Lab [X] Commercial Lab
   Name: **Toxicity testing is performed by Coastal Bioanalysts, Inc.**
   PCBs analysis performed by SGS, North Carolina

If plant performs any testing, complete 2-4.

2. What method is used for chlorine analysis? **DPD Colorimetric, HACH Method 8167**
3. Does plant appear to have sufficient equipment to perform required tests? [X] Yes [ ] No*
4. Does testing equipment appear to be clean and/or operable? [X] Yes [ ] No*

Comments:

(E) FOR INDUSTRIAL FACILITIES WITH TECHNOLOGY BASED LIMITS ONLY

1. Is the production process as described in the permit application? (If no, describe changes in comments)
   [ ] Yes [ ] No [X] NA
2. Do products and production rates correspond as provided in the permit application? (If no, list differences)
   [ ] Yes [ ] No [X] NA
3. Has the State been notified of the changes and their impact on plant effluent? Date:
   [ ] Yes [ ] No* [X] NA

Comments:

Problems identified at last inspection: July 21, 2010	Corrected	Not Corrected
None identified		

CURRENT INSPECTION SUMMARY

Comments:

- The secondary clarifiers had algae growth on the weirs. DEQ discussed the algae growth on the weirs with Mr. McGrath and based on recent DMR's, since the final effluent total suspended solids (TSS) are within permit limits, DEQ does not see the algae growth as an issue at this time. However, in the future, if effluent TSS values are above permit limits, then Noman Cole operations staff should consider increasing the cleaning frequency of the secondary clarifier weirs. **Photo 6**
- Less than a cubic yard of dried sludge was observed on the ground at the primary clarifiers. Operations staff immediately addressed it issue by cleaning up the dried sludge prior to DEQ staff departure. **Photos 2 & 3**
- A leak was observed at the pumps for the tertiary clarifier. Operations staff immediately investigated the situation and determined the incident was due to a seal water leak and fixed it problem. The pump was no longer leaking prior to DEQ staff departure. **Photo 8**
- The final effluent discharge receiving stream appeared healthy and no problems were observed.
- Operations staff should be commended on their efforts at maintaining a clean and organized facility especially during construction.

REQUEST for CORRECTIVE ACTION:

1. **The second standard for the daily verification spec check for total residual chlorine (TRC) was not being used to check the daily calibration curve.**

UNIT PROCESS: Screening/Comminution
Preliminary Treatment Building

1. Number of Units: Manual: Mechanical: **4**

   Number in operation: Manual: Mechanical: **1**

2. Bypass channel provided: [**X**] Yes [ ] No*
   Bypass channel in use: [ ] Yes [**X**] No

3. Area adequately ventilated: [**X**] Yes [ ] No*

4. Alarm system for equipment failure or overloads: [**X**] Yes [ ] No*

5. Proper flow distribution between units: [**X**] Yes [ ] No [ ] NA

6. How often are units checked and cleaned? **Every 2 hours, cleaned daily**

7. Cycle of operation: **Automatically activated based on head loss**

8. Volume of screenings removed: **95 tons/month**

9. General condition: [**X**] Good [ ] Fair [ ] Poor

Comments:

2) Flow can be diverted to emergency retention pond.

- **With the recent upgrades to the facility, all three mechanical bar screens were replaced and another one was added.**
- **The mesh screening is 3/8 inch.**
- **Each bar screen is rated to handle 70 MGD**
- **Two new screw conveyors were installed**

UNIT PROCESS: Grit Removal

1. Number of units: **6** In operation: **4**
2. Unit adequately ventilated: [**X**] Yes [ ] No*
3. Operation of grit collection equipment: [ ] Manual [ ] Time clock [**X**] Continuous duty
4. Proper flow distribution between units: [ ] Yes [ ] No* [**X**] NA
5. Daily volume of grit removed: **15-20 cubic yards/day**
6. All equipment operable: [**X**] Yes [ ] No*
7. General condition: [ ] Good [**X**] Fair [ ] Poor

Comments:

4) Grit removal is done on the primary sludge after it is screened with climbing tooth bar racks.

- **Six cyclone degritters and 3 grit classifiers are installed.**
- **Mr. McGrath said these units need to be rehabilitated and is projected to be done by the winter 2014.**

UNIT PROCESS: Emergency Storage Pond

1. Type: [ ] Aerated [**X**] Unaerated [ ] Polishing

2. No. of cells: **1** In operation: **0**

3. Color: [ ] Green [ ] Brown [ ] Light Brown [ ] Grey [**X**] Other: **Empty**

4. Odor: [ ] Septic* [ ] Earthy [**X**] None [ ] Other:

5. System operated in: [**X**] Series [ ] Parallel [ ] NA

6. If aerated, are lagoon contents mixed adequately? [ ] Yes [ ] No* [**X**] NA

7. If aerated, is aeration system operating properly? [ ] Yes [ ] No* [**X**] NA

8. Evidence of following problems:

   a. vegetation in lagoon or dikes [ ] Yes* [**X**] No
   b. rodents burrowing on dikes [ ] Yes* [**X**] No
   c. erosion [ ] Yes* [**X**] No
   d. sludge bars [ ] Yes* [**X**] No
   e. excessive foam [ ] Yes* [**X**] No
   f. floating material [ ] Yes* [**X**] No

9. Fencing intact: [ ] Yes [ ] No* [**X**] NA

10. Grass maintained properly: [**X**] Yes [ ] No

11. Level control valves working properly: [**X**] Yes [ ] No*

12. Effluent discharge elevation: [ ] Top [ ] Middle [**X**] Bottom

13. Freeboard: **NA**

14. Appearance of effluent: [ ] Good [ ] Fair [ ] Poor [**X**] NA

15. General condition: [**X**] Good [ ] Fair [ ] Poor

16. Are monitoring wells present? [ ] Yes [**X**] No

    Are wells adequately protected from runoff? [ ] Yes [ ] No* [**X**] NA

    Are caps on and secured? [ ] Yes [ ] No* [**X**] NA

Comments:
- **The 16 million gallon emergency storage pond is grass-lined and only used during emergencies.**
- **During the inspection, the pond contained no sewage.**

UNIT PROCESS: Sedimentation
Building C

[**X**] Primary [ ] Secondary [ ] Tertiary

1. Number of units:	**8**	In operation: **4**		
2. Proper flow distribution between units:		[**X**] Yes	[ ] No*	[ ] NA
3. Signs of short circuiting and/or overloads:		[ ] Yes	[**X**] No	
4. Effluent weirs level:		[**X**] Yes	[ ] No*	
Clean:		[**X**] Yes	[ ] No*	
5. Scum collection system working properly:		[**X**] Yes	[ ] No*	[ ] NA
6. Sludge collection system working properly:		[**X**] Yes	[ ] No*	
7. Influent, effluent baffle systems working properly:		[**X**] Yes	[ ] No*	
8. Chemical addition:		[ ] Yes	[**X**] No	
Chemicals:				
9. Effluent characteristics:	**Light tan with fine suspended particles**			
10. General condition:		[**X**] Good	[ ] Fair	[ ] Poor

Comments:

- **The primary clarifiers are covered and each tank is divided into three bays that are 15 feet wide.**
- **This arrangement accommodates the mecha nical sludge collectors.**
- **Sludge is pumped to Building H for grit removal.**

UNIT PROCESS: Activated Sludge Aeration
Old Side

1. Number of units: **6** In operation: **5**

2. Mode of operation: **Step Feed**

3. Proper flow distribution between units: [**X**] Yes [ ] No* [ ] NA

4. Foam control operational: [**X**] Yes [ ] No* [ ] NA

5. Scum control operational: [**X**] Yes [ ] No* [ ] NA

6. Evidence of following problems:

a. dead spots	[ ] Yes*	[**X**] No
b. excessive foam	[ ] Yes*	[**X**] No
c. poor aeration	[ ] Yes*	[**X**] No
d. excessive aeration	[ ] Yes*	[**X**] No
e. excessive scum	[ ] Yes*	[**X**] No
f. aeration equipment malfunction	[ ] Yes*	[**X**] No
g. other (identify in comments)	[ ] Yes*	[**X**] No

7. Mixed liquor characteristics (as available):

pH:	**6.2**	**s.u.**
MLSS:	**2900**	**mg/L**
DO:	**1.0 - 2.5**	**mg/L**
SVI:	**155**	
Color:	**Chocolate brown**	
Odor:	**Earthy**	
Settleability:	**450**	**ml/L**
Others (identify):		

8. Return/waste sludge:
   a. Return Rate: **20 MGD**
   b. Waste Rate: **0.4 MGD**
   c. Frequency of Wasting: **Continuous**

9. Aeration system control: [ ] Time Clock [ ] Manual [**X**] Continuous [ ] Other (explain)

10. Effluent control devices working properly (oxidation ditches): [ ] Yes [ ] No* [**X**] NA

11. General condition: [**X**] Good [ ] Fair [ ] Poor

Comments:

- **Each unit has 3 passes which are split 50/50 for anoxic/oxic zones.**
- **Hard scum and vegetation was observed on the surface of these units. Photos 4 & 5**

UNIT PROCESS: Activated Sludge Aeration
BNR

1. Number of units: **3** In operation: **3**

2. Mode of operation: **Step Feed**

---

3. Proper flow distribution between units: [**X**] Yes [ ] No* [ ] NA

4. Foam control operational: [**X**] Yes [ ] No* [ ] NA

5. Scum control operational: [**X**] Yes [ ] No* [ ] NA

6. Evidence of following problems:
   a. dead spots [ ] Yes* [**X**] No
   b. excessive foam [ ] Yes* [**X**] No
   c. poor aeration [ ] Yes* [**X**] No
   d. excessive aeration [ ] Yes* [**X**] No
   e. excessive scum [ ] Yes* [**X**] No
   f. aeration equipment malfunction [ ] Yes* [**X**] No
   g. other (identify in comments) [ ] Yes* [**X**] No

7. Mixed liquor characteristics (as available):
   pH: **6.2 s.u.**
   MLSS: **2900 mg/L**
   DO: **1.0 - 2.5 mg/L**
   SVI: **155**
   Color: **Chocolate brown**
   Odor: **Earthy**
   Settleability: **450 ml/L**
   Others (identify):

8. Return/waste sludge:
   a. Return Rate: **20 MGD**
   b. Waste Rate: **0.4 MGD**
   c. Frequency of Wasting: **Continuous**

9. Aeration system control: [ ] Time Clock [ ] Manual [**X**] Continuous [ ] Other (explain)

10. Effluent control devices working properly (oxidation ditches): [ ] Yes [ ] No* [**X**] NA

11. General condition: [**X**] Good [ ] Fair [ ] Poor

Comments:
- **Each unit has 6 passes which are split between anoxic and oxic zones.**

UNIT PROCESS: Sedimentation
Building F

[ ] Primary [**X**] Secondary [ ] Tertiary

1. Number of units: **10** In operation: **7**
2. Proper flow distribution between units: [**X**] Yes [ ] No* [ ] NA
3. Signs of short circuiting and/or overloads: [ ] Yes [**X**] No
4. Effluent weirs level: [**X**] Yes [ ] No*
   Clean: [ ] Yes [**X**] No*
5. Scum collection system working properly: [**X**] Yes [ ] No* [ ] NA
6. Sludge collection system working properly: [**X**] Yes [ ] No*
7. Influent, effluent baffle systems working properly: [**X**] Yes [ ] No*
8. Chemical addition: [**X**] Yes [ ] No
   Chemicals: **Polymer can be added, but is not currently used.**
9. Effluent characteristics: **Clear**
10. General condition: [**X**] Good [ ] Fair [ ] Poor

Comments:

4) The build-up of algae is unsightly, however, it is currently not affecting the downstream unit processes, nor does is it affecting the final effluent TSS. In the future if the final effluent TSS values are not in compliance with the permit, an increase of cleaning frequency of the secondary clarifier weirs is recommended.

- **Two weir washers have been installed. Mr. McGrath is currently evaluating the benefits of having these weir washers on the secondary clarifiers and whether or not the rest of the clarifiers will have these installed.**

UNIT PROCESS: Sedimentation
Building CC

[ ] Primary [ ] Secondary [**X**] Tertiary

1. Number of units: **5** In operation: **4**
2. Proper flow distribution between units: [**X**] Yes [ ] No* [ ] NA
3. Signs of short circuiting and/or overloads: [ ] Yes [**X**] No
4. Effluent weirs level: [**X**] Yes [ ] No*
   Clean: [ ] Yes [**X**] No*
5. Scum collection system working properly: [**X**] Yes [ ] No* [ ] NA
6. Sludge collection system working properly: [**X**] Yes [ ] No*
7. Influent, effluent baffle systems working properly: [**X**] Yes [ ] No*
8. Chemical addition: [**X**] Yes [ ] No
   Chemicals: **Ferric chloride. Hypochlorite when alga control is needed.**
9. Effluent characteristics: **Clear**
10. General condition: [ ] Good [**X**] Fair [ ] Poor

Comments:

4) Minimal vegetation observed on the weirs

- **Sludge is recycled to the plant headworks.**

UNIT PROCESS: Filtration
Building DD

1. Type of filters: [X] Gravity [ ] Pressure [ ] Intermittent

2. Number of units: **10** In operation: **5**

3. Operation of system: [X] Automatic [ ] Semi-automatic [ ] Manual [ ] Other(specify)

4. Proper flow distribution between units: [X] Yes [ ] No* [ ] NA

5. Evidence of following problems:

a.	uneven flow distribution	[ ] Yes*	[X] No
b	filter clogging (ponding)	[ ] Yes*	[X] No
c.	nozzles clogging	[ ] Yes*	[X] No
d.	icing	[ ] Yes*	[X] No
e.	filter flies	[ ] Yes*	[X] No
f.	vegetation on filter	[ ] Yes*	[X] No

6. Filter aid system provided: [ ] Yes [X] No
   Properly operating: [ ] Yes [ ] No [X] NA
   Chemical used:

7. Automatic valves properly operating: [X] Yes* [ ] No* [ ] NA

8. Valves sequencing correctly: [X] Yes* [ ] No* [ ] NA

9. Backwash system operating properly: [X] Yes* [ ] No* [ ] NA

10. Filter building adequately ventilated: [X] Yes* [ ] No* [ ] NA

11. Effluent characteristics: **Clear**

12. General condition: [ ] Good [X] Fair [ ] Poor

Comments:

- **These are multi-media filters with gravel, garnet, sand, and anthracite coal layers.**
- **Backwashing is controlled by a timer.**
- **Filters can run 18-20 hours between backwashing.**
- **Backwash cycle includes air scrub and filter effluent recycling.**
- **Backwash water is returned to the backwash tanks and then to the headworks.**
- **These units include an in-line turbidity meter.**

UNIT PROCESS: Filtration
Building FF

1. Type of filters: [**X**] Gravity [ ] Pressure [ ] Intermittent

2. Number of units: **8** In operation: **3**

3. Operation of system: [**X**] Automatic [ ] Semi-automatic [ ] Manual [ ] Other(specify)

4. Proper flow distribution between units: [**X**] Yes [ ] No* [ ] NA

5. Evidence of following problems:

a.	uneven flow distribution	[ ] Yes*	[**X**] No
b	filter clogging (ponding)	[ ] Yes*	[**X**] No
c.	nozzles clogging	[ ] Yes*	[**X**] No
d.	icing	[ ] Yes*	[**X**] No
e.	filter flies	[ ] Yes*	[**X**] No
f.	vegetation on filter	[ ] Yes*	[**X**] No

6. Filter aid system provided: [ ] Yes [**X**] No
   Properly operating: [ ] Yes [ ] No [**X**] NA
   Chemical used:

7. Automatic valves properly operating: [**X**] Yes* [ ] No* [ ] NA

8. Valves sequencing correctly: [**X**] Yes* [ ] No* [ ] NA

9. Backwash system operating properly: [**X**] Yes* [ ] No* [ ] NA

10. Filter building adequately ventilated: [**X**] Yes* [ ] No* [ ] NA

11. Effluent characteristics: **Clear**

12. General condition: [**X**] Good [ ] Fair [ ] Poor

Comments:

- **These tanks were carbon columns and were converted to mono-media anthracite filters.**
- **One unit is out of service for repairs to the underdrain system.**
- **Filters backwashing is controlled by a timer.**
- **Backwash water is returned to the backwash tanks and then to the headworks.**
- **These units include an in-line turbidity meter.**

UNIT PROCESS: Chlorination
Building HH

1	No. of chlorinators:		In operation:	
2.	No. of evaporators:		In operation:	
3.	No. of chlorine contact tanks:	**1**	In operation:	**1**
4.	Proper flow distribution between units:		[ ] Yes [ ] No*	[**X**] NA

5. How is chlorine introduced into the wastewater?
   [**X**] Perforated diffusers
   [ ] Injector with single entry point
   [ ] Other

6.	Chlorine residual in basin effluent:	**Did not evaluate**	
7.	Applied chlorine dosage:	**2500 lbs/day**	
8.	Contact basins adequately baffled:	[**X**] Yes [ ] No*	
9.	Adequate ventilation:		
	a. cylinder storage area	[ ] Yes [ ] No*	[**X**] NA
	b. equipment room	[**X**] Yes [ ] No*	
10.	Proper safety precautions used:	[**X**] Yes [ ] No*	
11.	General condition:	[**X**] Good [ ] Fair	[ ] Poor

Comments:
- **The chlorine tanks were replaced this past summer 2012.**
- **Each tank has a containment berm and low level alarm.**
- **These tanks feed solution throughout the plant for odor control, alga prevention, and disinfection.**
- **Chlorine is fed prior to the tertiary filters but is tested at the end of the contact tank in Building HH.**

UNIT PROCESS: Dechlorination
Building HH

1. Chemical used:	[ ] Sulfur Dioxide		[**X**] Bisulfite	[ ] Other
2. No. of sulfonators:		In operation:		
3. No. of evaporators:		In operation:		
4. No. of chemical feeders:	**2**	In operation:	**1**	
5. No. of contact tanks:	**1**	In operation:	**1**	
6. Proper flow distribution between units:		[ ] Yes	[ ] No*	[**X**] NA

7. How is chemical introduced into the wastewater?
   [**X**] Perforated diffusers
   [ ] Injector with single entry point
   [ ] Other

8. Control system operational:	[**X**] Yes	[ ] No*	
a. residual analyzers:	[**X**] Yes	[ ] No*	
b. system adjusted:	[ ] Automatic	[ ] Manual	[**X**] Other:
9. Applied dechlorination dose:	**10-15 gal/hour**		
10. Chlorine residual in basin effluent:	**Did not evaluate**		
11. Contact basins adequately baffled:	[**X**] Yes	[ ] No*	[ ] NA
12. Adequate ventilation:			
a. cylinder storage area:	[ ] Yes	[ ] No*	[**X**] NA
b. equipment room:	[**X**] Yes	[ ] No*	
13. Proper safety precautions used:	[**X**] Yes	[ ] No*	
14. General condition:	[**X**] Good	[ ] Fair	[ ] Poor

Comments:
- **The system is flow paced to maintain a typical dosage of 2 mg/L.**
- **Based on operator tests, the dosage per flow unit is adjusted.**
- **Effluent DO, pH, and chlorine samples are collected in this building.**
- **Effluent composites are collected using an autosampler in this building.**

UNIT PROCESS: Flow Measurement

[ ] Influent [ ] Intermediate [**X**] Effluent

1. Type measuring device: **Millitronics OCM III**
2. Present reading: **33.65 MGD**
3. Bypass channel: [ ] Yes [**X**] No
   Metered: [ ] Yes [**X**] No
4. Return flows discharged upstream from meter: [ ] Yes [**X**] No
   Identify:
5. Device operating properly: [**X**] Yes [ ] No*
6. Date of last calibration: **08/16/12**
7. Evidence of following problems:
   a. obstructions [ ] Yes* [**X**] No
   b. grease [ ] Yes* [**X**] No
8. General condition: [**X**] Good [ ] Fair [ ] Poor

Comments:
Meter calibration is performed by in-house technicians

UNIT PROCESS: Effluent/Plant Outfall

1. Type Outfall [X] Shore based [ ] Submerged
2. Type if shore based: [ ] Wingwall [X] Headwall [ ] Rip Rap
3. Flapper valve: [ ] Yes [X] No [ ] NA
4. Erosion of bank: [ ] Yes [X] No [ ] NA
5. Effluent plume visible? [ ] Yes* [X] No
6. Condition of outfall and supporting structures: [X] Good [ ] Fair [ ] Poor*
7. Final effluent, evidence of following problems:
   a. oil sheen [ ] Yes* [X] No
   b. grease [ ] Yes* [X] No
   c. sludge bar [ ] Yes* [X] No
   d. turbid effluent [ ] Yes* [X] No
   e. visible foam [ ] Yes* [X] No
   f. unusual color [ ] Yes* [X] No

Comments:
From Building HH, the outfall is monitored via camera for foam control.
- **If foam is present, two pumps feed Dow Corning Antifoam 1410 to the final weir after dechlorination.**
- **Lab technicians record visual observations at the outfall each day and collect receiving stream samples.**

UNIT PROCESS: Gravity Thickening
Building J

1. Number of units: **4** In operation: **2**

2. Types of sludge(s) fed to the thickener:
   [X] Primary [ ] WAS [ ] Combination [ ] Other:

3. Solids concentration in the influent sludge: **0.6-0.7 %**
   Thickened sludge: **3-4 %**

4. Sludge feeding: [X] Continuous [ ] Intermittent

5. Signs of short-circuiting and/or overloads: [ ] Yes* [X] No

6. Effluent weirs level: [X] Yes [ ] No*

7. Sludge collection system work properly: [X] Yes [ ] No*

8. Influent, effluent baffle systems work properly: [X] Yes [ ] No*

9. Chemical addition: [X] Yes [ ] No
   Identify chemical, dose: **Magnafloc 1011 polymer**

10. General condition: [X] Good [ ] Fair [ ] Poor

Comments:

- **Three centrifugal pumps are used for pumping degritted sludge to the primary thickener.**
- **Supernatant is returned to a wet well in Building B at the head of the plant.**
- **The plant is using 2 thickeners as fermenters. The unit is filled over a ten hour period and then settles for 10 hours. This increases the volatile fatty acids and improves phosphorus removal.**

UNIT PROCESS: Flotation Thickening
Building Q

1.	Number of units:	**3**	In operation:	**1**
2.	Flotation aid system provided:	[**X**] Yes	[ ] No	
	Type of aid/dosage:	**Deltafloc 770, 150 gpd**		
3.	Sludge pumping:	[ ] Manual	[**X**] Automatic	
4.	Skimmer blade sludge removal system operating properly	[**X**] Yes	[ ] No*	
5.	Sludge collection system operating properly:	[**X**] Yes	[ ] No*	
6.	Effluent baffle system working properly:	[**X**] Yes	[ ] No*	
7.	Is the unit used to thicken sludges other than WAS?	[**X**] No	[ ] Yes (specify)	
	Other types of sludge:			
8.	Signs of overloading:	[ ] Yes*	[**X**] No	
9.	Process control testing:			
	a. feed solids testing:	[**X**] Yes	[ ] No	**1 %**
	b. thickened sludge solids testing:	[**X**] Yes	[ ] No	**3-4 %**
	c. underflow testing:	[**X**] Yes	[ ] No	**< 100 mg/L**
	d. other(specify):			
10.	Percent capture of solids:	**99** %		
11.	General condition:	[**X**] Good	[ ] Fair	[ ] Poor

Comments:

- **DAF thickened sludge is pumped to the R1 or R2 holding tank.**
- **The holding tank sludge is mixed with primary sludge prior to dewatering.**
- **A 30 inch sludge blanket is maintained in the holding tanks.**

UNIT PROCESS: Centrifugation

1. Number of units:	**4**	In operation:	**1**	
2. Purpose of centrifuges:	[ ] Thickening		[**X**] Dewatering	[ ] Other
3. Operation of equipment:	[ ] Manual		[**X**] Automatic	[ ] Other
4. Centrifuge run time:	**24 hrs/day**			
5. Volume of influent sludge flow:	**255 gal/min**			
6. Amount cake produced:	**~45 ton/day**			
7. Sludge solids: Influent:	**3 %**			
Effluent:	**28 %**			
8. Conditioning chemical fed:	**Polymer**	Dose:	**7.5 lb/dry ton cake**	
9. Centrate return location:	**Headworks**			
Signs of problems:	[ ] Yes*	[**X**] No		
10. General condition:	[ ] Good	[**X**] Fair	[ ] Poor	

Comments:

- **One of the centrifuges was sent back to the factory for maintenance. After 10,000 hours of run time, the centrifuges are sent back to the factory for preventative maintenance.**

LABORATORY INSPECTION REPORT SUMMARY

FACILITY NAME: Noman Cole Jr. WWTF	FACILITY NO: VA0025364	INSPECTION DATE: September 25, 2012
(X) Deficiencies	( ) No Deficiencies	

LABORATORY RECORDS

The Laboratory Records section had **No Deficiencies** noted during the inspection.

GENERAL SAMPLING AND ANALYSIS

The General Sampling and Analysis section had **No Deficiencies** noted during the inspection.

LABORATORY EQUIPMENT

The Laboratory Equipment section had **No Deficiencies** noted during the inspection.

INDIVIDUAL PARAMETERS

Dissolved Oxygen (DO)

The analysis for the parameter D.O. had **No Deficiencies** noted during the inspection.

pH

The analysis for the parameter pH had **No Deficiencies** noted during the inspection.

Total Residual Chlorine (TRC)

The analysis for the parameter TRC had a **Deficiency** noted during the inspection.

- **The second chlorine standard for the daily calibration verification was not being conducted.**

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
LABORATORY INSPECTION REPORT

10/01

FACILITY NO:	INSPECTION DATE:	LAST INSPECTION:	PREVIOUS EVALUATION:	TIME SPENT:
VA0025364	September 25, 2012	July 21, 2010	Deficiencies	2 hours

NAME/ADDRESS OF FACILITY:	FACILITY CLASS:	FACILITY TYPE:	UNANNOUNCED INSPECTION?
Noman Cole Jr. WWTF 9399 Richmond Hwy Lorton, VA 22199	(X) MAJOR ( ) MINOR ( ) SMALL ( ) VPA/NDC	(X) MUNICIPAL ( ) INDUSTRIAL ( ) FEDERAL ( ) COMMERCIAL LAB	(X) YES ( ) NO **FY-SCHEDULED INSPECTION?** (X) YES ( ) NO

INSPECTOR(S):	REVIEWERS:	PRESENT AT INSPECTION:
Ms. Rebecca Johnson & Ms. Sharon Allen	Edward L. Stuart	Mr. Mike McGrath and Mr. Chuck Longerbeam

LABORATORY EVALUATION	DEFICIENCIES? Yes	No
LABORATORY RECORDS		X
GENERAL SAMPLING & ANALYSIS		X
LABORATORY EQUIPMENT		X
QUALTIY ASSURANCE/QUALITY CONTROL		X
DISSOLVED OXYGEN ANALYSIS PROCEDURES		X
pH ANALYSIS PROCEDURES		X
TRC ANALYSIS PROCEDURES	X	

QUALITY ASSURANCE/QUALITY CONTROL

Y/N	QUALITY ASSURANCE METHOD	PARAMETERS	FREQUENCY
	REPLICATE SAMPLES		
	SPIKED SAMPLES		
	STANDARD SAMPLES	pH and TRC	daily
	SPLIT SAMPLES		
	SAMPLE BLANKS		
	OTHER		
	EPA-DMR QA DATA?	RATING: (X) No Deficiency ( ) Deficiency ( ) NA	
	QC SAMPLES PROVIDED?	RATING: ( ) No Deficiency ( ) Deficiency ( ) NA	

FACILITY #: **VA0025364**

LABORATORY RECORDS SECTION

LABORATORY RECORDS INCLUDE THE FOLLOWING:

X	SAMPLING DATE	X	ANALYSIS DATE	X	CONT MONITORING CHART
X	SAMPLING TIME	X	ANALYSIS TIME	X	INSTRUMENT CALIBRATION
X	SAMPLE LOCATION	X	TEST METHOD	X	INSTRUMENT MAINTENANCE
				X	CERTIFICATE OF ANALYSIS

WRITTEN INSTRUCTIONS INCLUDE THE FOLLOWING:

X	SAMPLING SCHEDULES		CALCULATIONS	X	ANALYSIS PROCEDURES

	YES	NO	N/A
DO ALL ANALYSTS INITIAL THEIR WORK?	X		
DO BENCH SHEETS INCLUDE ALL INFORMATION NECESSARY TO DETERMINE RESULTS?	X		
IS THE DMR COMPLETE AND CORRECT? MONTH(S) REVIEWED: **July 2012**	X		
ARE ALL MONITORING VALUES REQUIRED BY THE PERMIT REPORTED?	X		

GENERAL SAMPLING AND ANALYSIS SECTION

	YES	NO	N/A
ARE SAMPLE LOCATION(S) ACCORDING TO PERMIT REQUIREMENTS?	X		
ARE SAMPLE COLLECTION PROCEDURES APPROPRIATE?	X		
IS SAMPLE EQUIPMENT CONDITION ADEQUATE?	X		
IS FLOW MEASUREMENT ACCORDING TO PERMIT REQUIREMENTS?	X		
ARE COMPOSITE SAMPLES REPRESENTATIVE OF FLOW?	X		
ARE SAMPLE HOLDING TIMES AND PRESERVATION ADEQUATE?	X		
IF ANALYSIS IS PERFORMED AT ANOTHER LOCATION, ARE SHIPPING PROCEDURES ADEQUATE? LIST PARAMETERS AND NAME & ADDRESS OF LAB: **Toxicity testing is performed by Coastal Bioanalysts, Inc. PCBs analysis performed by SGS, North Carolina**	X		

LABORATORY EQUIPMENT SECTION

	YES	NO	N/A
IS LABORATORY EQUIPMENT IN PROPER OPERATING RANGE?	X		
ARE ANNUAL THERMOMETER CALIBRATION(S) ADEQUATE?	X		

ANALYST:	**Lindsay Feaster**	VPDES NO.	**VA0025364**

Parameter: Dissolved Oxygen
Method: Electrode
Facility Elevation: 10 feet
01/08

Meter: YSI 55

METHOD OF ANALYSIS:

	18th Edition of Standard Methods-4500-O G
X	21st or Online Editions of Standard Methods-4500-O G (01)

	DO is a method defined analyte so modifications are not allowed. [40 CFR Part 136.6]	**Y**	**N**
1)	If samples are collected, is collection carried out with a minimum of turbulence and air bubble formation and is the sample bottle allowed to overflow several times its volume? [B.3]	**In-situ**	
2)	Are meter and electrode operable and providing consistent readings? [3]	**X**	
3)	Is membrane in good condition without trapped air bubbles? [3.b]	**X**	
4)	Is correct filling solution used in electrode? [Mfr.]	**X**	
5)	Are water droplets shaken off the membrane prior to calibration? [Mfr.]	**X**	
6)	Is meter calibrated before use or at least daily? [Mfr.]	**X**	
7)	Is calibration procedure performed according to manufacturer's instructions? [Mfr.]	**X**	
8)	Is sample stirred during analysis? [Mfr.]	**In-situ**	
9)	Is the sample analysis procedure performed according to manufacturer's instructions? [Mfr.]	**X**	
10)	Is meter stabilized before reading D.O.? [Mfr.]	**X**	
11)	Is electrode stored according to manufacturer's instructions? [Mfr.]	**X**	
12)	Is a duplicate sample analyzed after every 20 samples if citing 18th or 19th Edition [1020 B.6] or daily if citing 20th or 21st Edition [Part 1020] Note: Not required for *in situ* samples.	**NA**	
13)	If a duplicate sample is analyzed, is the reported value for that sampling event, the average concentration of the sample and the duplicate? [DEQ]	**NA**	
14)	If a duplicate sample is analyzed, is the relative percent difference (RPD) < 20? [18th ed. Table 1020 I; 21st ed. DEQ]	**NA**	

COMMENTS:	**No problems observed**
PROBLEMS:	

ANALYST:	**Lindsay Feaster**	VPDES NO	**VA0025364**

Parameter: Hydrogen Ion (pH)
Method: Electrometric
01/08

Meter: Accumet Basic AB 15 pH Meter

METHOD OF ANALYSIS

	18th Edition of Standard Methods-4500-H-B
X	21st or On-Line Edition of Standard Methods-4500-H-B (00)

	pH is a method defined analyte so modifications are not allowed. [40 CFR Part 136.6]	Y	N
1)	Is a certificate of operator competence or initial demonstration of capability available for each analyst/operator performing the analysis? **NOTE:** Analyze 4 samples of known pH. May use external source of buffer (different lot/manufacturer than buffers used to calibrate meter). Recovery for each of the 4 samples must be ± 0.1 SU of the known concentration of the sample. [SM 1020 B.1]	X	
2)	Is the electrode in good condition (no chloride precipitate, etc.)? [2.b/c and 5.b]	X	
3)	Is electrode storage solution in accordance with manufacturer's instructions? [Mfr.]	X	
4)	Is meter calibrated on at least a daily basis using three buffers all of which are at the same temperature? [4.a] NOTE: Follow manufacturer's instructions.	X	
5)	After calibration, is a buffer analyzed as a check sample to verify that calibration is correct? Agreement should by within ± 0.1 SU. [4.a]	X	
6)	Do the buffer solutions appear to be free of contamination or growths? [3.1]	X	
7)	Are buffer solutions within their listed shelf life or have they been prepared within the last 4 weeks? [3.a]	X	
8)	Is the cap or sleeve covering the access hole on the reference electrode removed when measuring pH? [Mfr.]	NA	
9)	For meters with ATC that also have temperature display, was the thermometer calibrated annually? [SM2550 B.1] **Thermistor was checked 9/13/12**	X	
10)	Is the temperature of buffer solutions and samples recorded when determining pH? [4.a]	X	
11)	Is sample analyzed within 15 minutes of collection? [40 CFR 136.6]	X	
12)	Was the electrode rinsed and then blotted dry between reading solutions (Disregard if a portion of the next sample analyzed is used as the rinse solution)? [4.a]	X	
13)	Is the sample stirred gently at a constant speed during measurement? [4.b]	X	
14)	Does the meter hold a steady reading after reaching equilibrium? [4.b]	X	
15)	Is a duplicate sample analyzed after every 20 samples if citing 18th or 19th Edition [1020 B.6] or daily for 20th or 21st Edition [Part 1020] Note: Not required for *in situ* samples.	NA	
16)	Is pH of duplicate samples within 0.1 SU of the original sample? [Part 1020]	NA	
17)	Is there a written procedure for which result will be reported on DMR (Sample or Duplicate) and is this procedure followed? [DEQ]	NA	

COMMENTS:	**As of July 2008, field parameters do not require duplicate analysis so steps 15-17 are not applicable.**
PROBLEMS:	**None observed.**

ANALYST:	**Lindsay Feaster**	VPDES NO	**VA0025364**

Parameter: Total Residual Chlorine
Method: DPD Colorimetric (HACH Pocket Colorimeter™)
01/08

Meter: Pocket Colorimeter II

METHOD OF ANALYSIS:

X	HACH Manufacturer's Instructions (Method 8167) plus an edition of Standard Methods
	18th Edition of Standard Methods 4500-Cl G
X	21st Edition of Standard Methods 4500-Cl G (00)

		Y	N
1)	Is a certificate of operator competence or initial demonstration of capability available for each analyst/operator performing this analysis? NOTE: Analyze 4 samples of known TRC. Must use a lot number or source that is different from that used to prepare calibration standards. May not use Specv ™. [SM 1020 B.1]	X	
2)	Are the DPD PermaChem® Powder Pillows stored in a cool, dry place? [Mfr.]	X	
3)	Are the pillows within the manufacturer's expiration date? [Mfr]	X	
4)	Has buffering capability of DPD pillows been checked annually? (Pillows should adjust sample pH to between 6 and 7) [Mfr]	X	
5)	When pH adjustment is required, is H_2SO_4 or NaOH used? [11.3.1]	NA	
6)	Are cells clean and in good condition? [Mfr]	X	
7)	Is the low range (0.01-mg/L resolution) used for samples containing residuals from 0-2.00 mg/L? [Mfr.]	X	
8)	Is calibration curve developed (may use manufacturer's calibration) with daily verification using a high and a low standard? NOTE: May use manufacturer's installed calibration and commercially available chlorine standards for daily calibration verifications. [18th ed 1020 B.5; 21st ed 4020 B.2.b]		X
9)	Is the 10-mL cell (2.5-cm diameter) used for samples from 0-2.00 mg/L? [Mfr.]	X	
10)	Is the meter zeroed correctly by using sample as blank for the cell used? [Mfr.]	X	
11)	Is the instrument cap placed correctly on the meter body when the meter is zeroed and when the sample is analyzed? [Mfr.]	X	
12)	Is the DPD Total Chlorine PermaChem® Powder Pillow mixed into the sample? [HACH 11.1]	X	
13)	Is the analysis made at least three minutes but not more than six minutes after PermaChem® Powder Pillow addition? [11.2]	X	
14)	If read-out is flashing [2.20], is sample diluted correctly, then reanalyzed? [1.2 & 2.0]	NA	
15)	Are samples analyzed within 15 minutes of collection? [40 CFR Part 136]	X	
16)	Is a duplicate sample analyzed after every 20 samples if citing 18th Edition [SM 1020 B.6] or daily for 21st Edition [SM 4020 B.3.c]?	NA	
17)	If duplicate sample is analyzed, is the relative percent difference (RPD) = 20? [18th ed. Table 1020 I; 21st ed. DEQ]	NA	

COMMENTS:	
PROBLEMS:	**8. The second chlorine standard for the daily calibration verification was not being conducted.**

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
EQUIPMENT TEMPERATURE LOG/THERMOMETER CALIBRATION CHECK SHEET
01-08

FACILITY NAME:	Noman Cole Jr WWTF	VPDES NO:	VA0025364	DATE:	September 25, 2012

EQUIPMENT	RANGE	IN RANGE		INSPECTION READING °C		CHECK & LOG DAILY		CORRECT INCREMENT		ANNUAL THERMOMETER CALIBRATION: Is the NIST/NIST Traceable Reference Thermometer within Manufacturer's expiration date or recertified yearly? Yes/No: **Yes**				
										DATE CHECKED	MARKED		CORR FACTOR	INSPECTION TEMP °C
		Y	N	DEQ	Site	Y	N	Y	N		Y	N		
SAMPLE REFRIGER.	1-6° C	**X**		**NA**	**N/A**					**Nov 2011**	**X**		**0.5°C**	**4.2**
AUTO SAMPLER	1-6° C	**X**		**NA**	**4.0°C**					**Jan. 2012**	**X**		**-0.5°C**	**5.9**
REAGENT REFRIGER.	1-6° C													
pH METER	± 1° C	**X**		**N/A**	**N/A**					**Oct 2011**	**X**		**-0.3°C**	**22.7**
FIELD DO METER	± 1° C	**X**		**N/A**	**N/A**					**May 2012**	**X**		**-0.1°C**	**24.8**

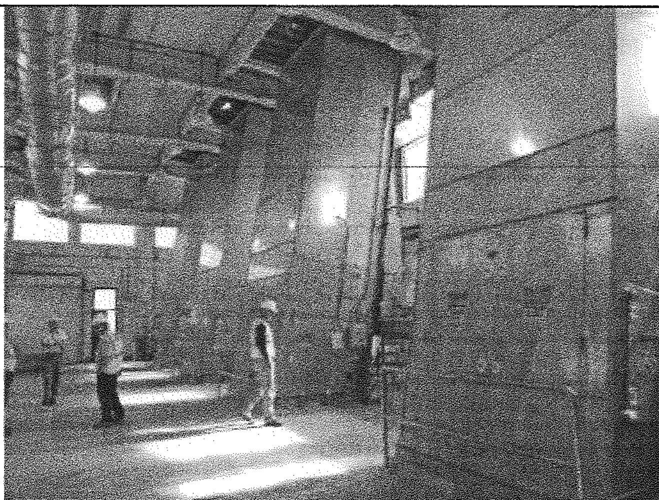
COMMENTS:	
PROBLEMS:	**None observed.**

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
SAMPLE ANALYSIS HOLDING TIME/CONTAINER/PRESERVATION CHECK SHEET
Revised 03/08 [40 CFR, Part 136.3, Table II]

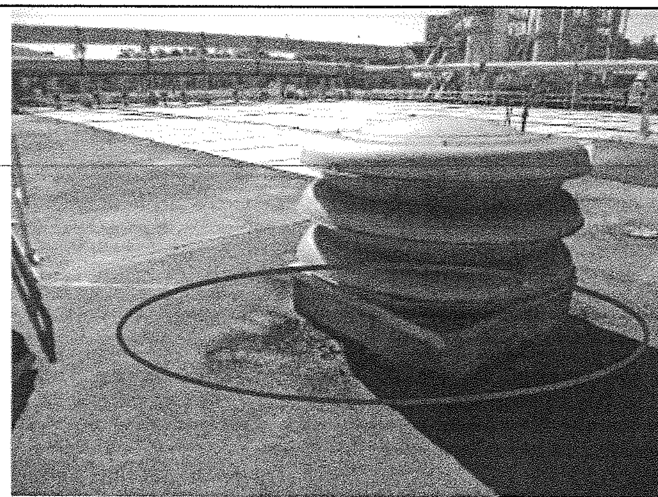
FACILITY NAME:	**Noman Cole Jr. WWTF**	VPDES NO	**VA0025364**	DATE:	**September 25, 2012**

HOLDING TIMES						SAMPLE CONTAINER				PRESERVATION				
PARAMETER	APPROVED	MET?		LOGGED?		ADEQ. VOLUME		APPROP. TYPE		APPROVED	MET?		CHECKED?	
		Y	N	Y	N	Y	N	Y	N		Y	N	Y	N
BOD5 & CBOD5	48 HOURS	X		X		X		X		6° C	X		X	
TSS	7 DAYS	X		X		X		X		6° C	X		X	
pH	15 MIN.	X		X		X		X		N/A	X		X	
CHLORINE	15 MIN.	X		X		X		X		N/A	X		X	
DISSOLVED 0_2	15 MIN./IN SITU	X		X		X		X		N/A	X		X	
TEMPERATURE	IMMERSION STAB.	X		X		X		X		N/A	X		X	
TKN	28 DAYS	X		X		X		X		6° C+H_2S0_4 pH<2 DECHLOR	X		X	
NITRATE+NITRITE	28 DAYS	X		X		X		X		6° C+H_2S0_4 pH<2	X		X	
E.Coli	6 Hours	X		X		X		X		<10 ° C, $NaS_2O_3{}^5$	X		X	
TOTAL PHOS.	28 DAYS	X		X		X		X		6° C+H_2S0_4 pH<2	X		X	
AMMONIA	28 DAYS	X		X		X		X		6° C+H_2S0_4 pH<2	X		X	

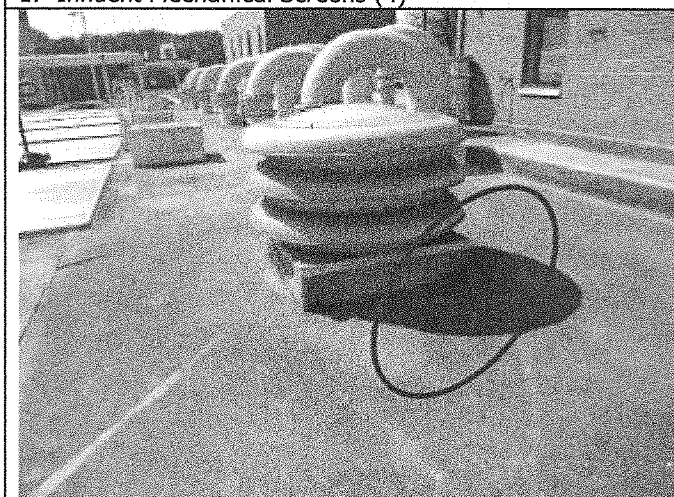
COMMENTS:	
PROBLEMS:	**None observed.**



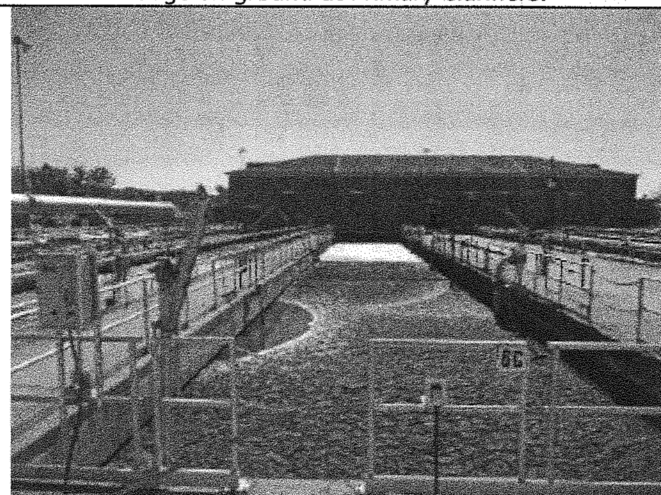
1. Influent Mechanical Screens (4)



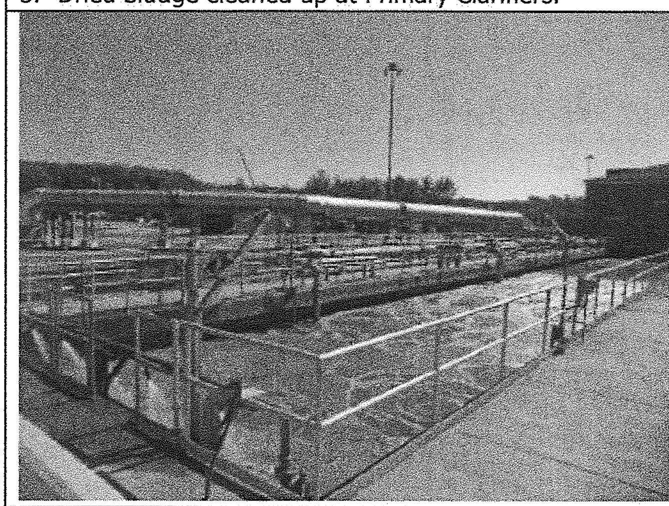
2. Dried Sludge on ground at Primary Clarifiers.



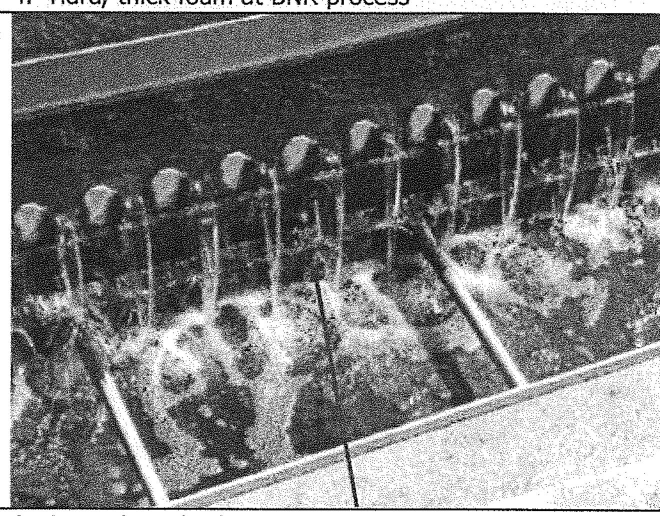
3. Dried Sludge cleaned up at Primary Clarifiers.



4. Hard, thick foam at BNR process



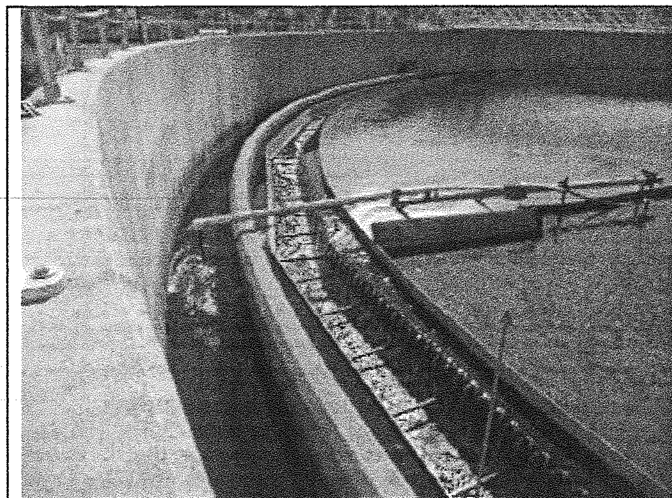
5. Healthy activated sludge at BNR process

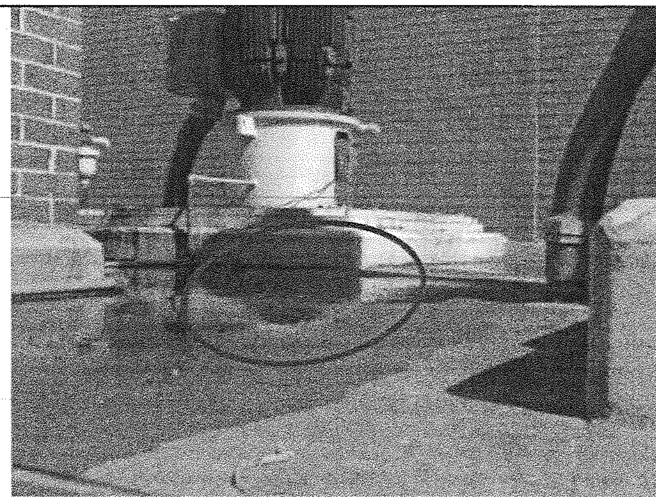


6. Secondary clarifier weirs with some algae growth

Photos by: Sharon Allen
Layout by: Rebecca Johnson

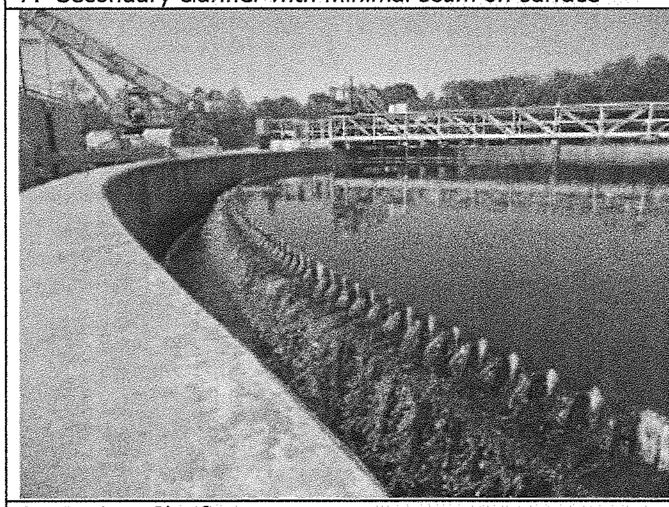
VA0025364
Noman Cole Jr. WWTF
September 25, 2012

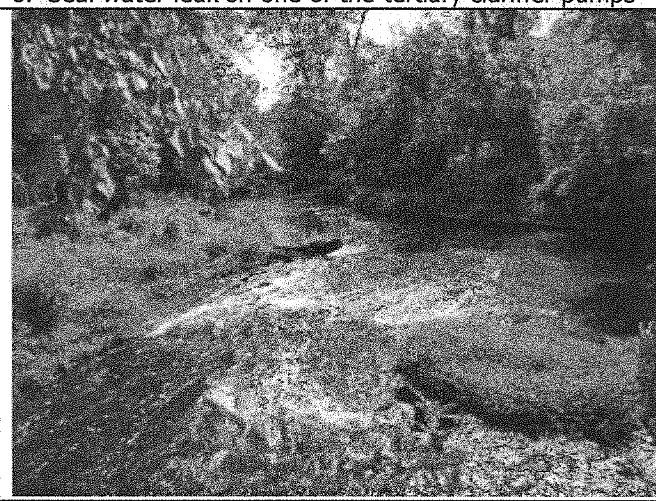




7. Secondary clarifier with minimal scum on surface

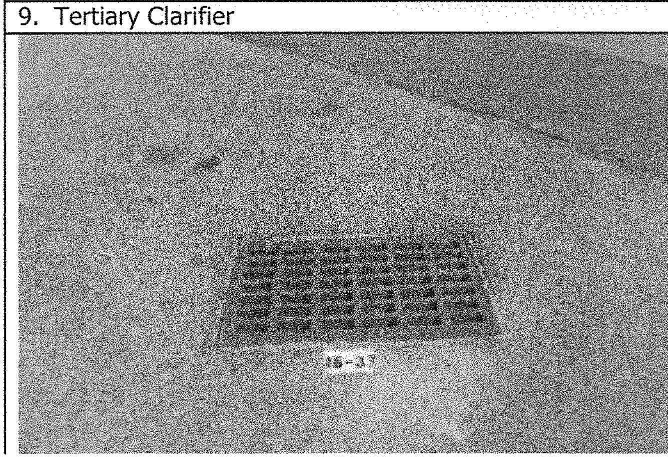
8. Seal water leak on one of the tertiary clarifier pumps

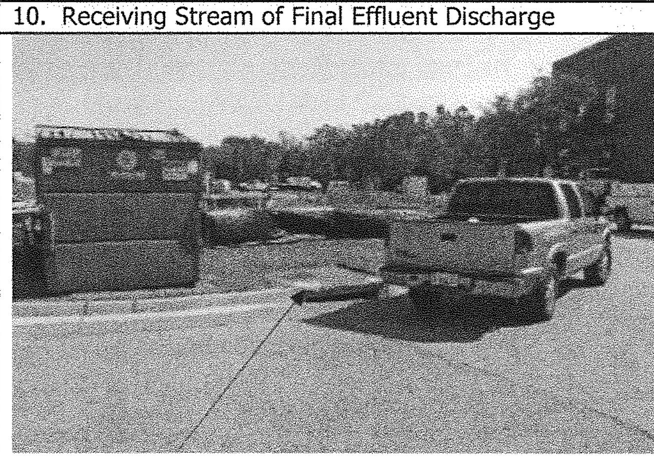




9. Tertiary Clarifier

10. Receiving Stream of Final Effluent Discharge





To:	Joan C. Crowther
From:	Jennifer Carlson
Date:	May 8, 2013
Subject:	Planning Statement for Noman M. Cole Pollution Control Plant
Permit Number:	VA0025364

Information for Outfall 001:

Discharge Type: Municipal
Discharge Flow: 67 MGD
Receiving Stream: Pohick Creek
Latitude / Longitude: 38°41'53" / 77°12'03"
Rivermile: 4.79
Streamcode: 1aPOH
Waterbody: VAN-A16R
Water Quality Standards: Section 7, Stream Class III, Special Standards b
Drainage Area: 32 sq miles

1. Please provide water quality monitoring information for the receiving stream segment. If there is not monitoring information for the receiving stream segment, please provide information on the nearest downstream monitoring station, including how far downstream the monitoring station is from the outfall.

This facility discharges into Pohick Creek. DEQ monitoring station 1aPOH005.36 is located at the Rt. 1 bridge crossing, approximately 0.6 miles upstream of Outfall 001. This station is a trend monitoring station and has been sampled regularly since 2002. There is also a DEQ station, 1aPOH004.79, located at the Rt. 611 bridge crossing, approximately 0.04 miles upstream of Outfall 001. This station was last sampled in 2005/2006 for a PCB special study. Previous to this, the station was last regularly sampled in the 1970's. The following is the water quality summary for Pohick Creek, as taken from the Draft 2012 Integrated Report*:

Class III, Section 7, special stds. b.

DEQ ambient water quality monitoring stations 1aPOH004.79, at Route 611, and 1aPOH005.36 at Route 1.

E. coli monitoring finds a bacterial impairment, resulting in an impaired classification for the recreation use.

The aquatic life and wildlife uses are considered fully supporting. The fish consumption use is fully supporting with observed effects due to SPMD data revealed an exceedance of the human health criteria of 0.64 parts per billion (ppb) polychlorinated biphenyls (PCBs).

**Virginia's Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently awaiting final approval.*

2. Does this facility discharge to a stream segment on the 303(d) list? If yes, please fill out Table A.

Yes.

Table A. 303(d) Impairment and TMDL information for the receiving stream segment

Waterbody Name	Impaired Use	Cause	TMDL completed	WLA	Basis for WLA	TMDL Schedule
Impairment Information in the Draft 2012 Integrated Report*						
Pohick Creek	Recreation	*E. coli*	No	N/A	N/A	2018

**Virginia's Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently awaiting final approval.*

3. Are there any downstream 303(d) listed impairments that are relevant to this discharge? If yes, please fill out Table B.

Yes.

Table B. Information on Downstream 303(d) Impairments and TMDLs

<table>
<tr><th>Waterbody Name</th><th>Impaired Use</th><th>Cause</th><th>Distance From Outfall</th><th>TMDL completed</th><th>WLA</th><th>Basis for WLA</th><th>TMDL Schedule</th></tr>
<tr><td colspan="8">Impairment Information in the Draft 2012 Integrated Report*</td></tr>
<tr><td rowspan="3">Pohick Creek (tidal)</td><td rowspan="2">Fish Consumption</td><td>Benzo(k)-fluoranthene</td><td>1 mile</td><td>No</td><td>N/A</td><td>N/A</td><td>2014</td></tr>
<tr><td>PCBs</td><td>1 mile</td><td>Tidal Potomac PCB 10/31/2007</td><td>5.92 grams/year PCB</td><td>0.064 ng/L
---
67 MGD</td><td>N/A</td></tr>
<tr><td>Aquatic Life</td><td>pH</td><td>2.4 miles</td><td>No</td><td>N/A</td><td>N/A</td><td>2024</td></tr>
<tr><td colspan="8">Information in the Chesapeake Bay TMDL</td></tr>
<tr><td rowspan="3">Chesapeake Bay</td><td rowspan="3">Aquatic Life</td><td>Total Nitrogen</td><td rowspan="3">---</td><td rowspan="3">Chesapeake Bay TMDL 12/29/2010</td><td>612,158 lbs/yr TN</td><td rowspan="3">Edge of Stream (EOS) Loads</td><td rowspan="3">N/A</td></tr>
<tr><td>Total Phosphorus</td><td>36,729 lbs/yr TP</td></tr>
<tr><td>Total Suspended Solids</td><td>6,121,575.6 lbs/yr TSS</td></tr>
</table>

**Virginia's Draft 2012 Integrated Report (IR) has been through the public comment period and reviewed by EPA. The 2012 IR is currently awaiting final approval.*

4. Is there monitoring or other conditions that Planning/Assessment needs in the permit?

The tidal Potomac River is listed with a PCB impairment and a TMDL has been developed to address this impairment. This facility has been included in the Tidal Potomac River PCB TMDL and has received a WLA. This facility conducted PCB monitoring during the last permit cycle in support of the PCB TMDL.

The PCB monitoring data will be evaluated, and source reductions through pollution minimization plans may be needed.

5. Fact Sheet Requirements – Please provide information regarding any drinking water intakes located within a 5 mile radius of the discharge point.

There are no public water supply intakes located within 5 miles of this discharge.

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Noman M. Cole Jr PCP (April - October)(Yearly) Permit No.: VA0025364

Receiving Stream: Pohick Creek

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	38 mg/L
90% Temperature (Annual) =	23.77 deg C
90% Temperature (Wet season) =	deg C
90% Maximum pH =	7.41 SU
10% Maximum pH =	SU
Tier Designation (1 or 2) =	1
Public Water Supply (PWS) Y/N? =	n
Trout Present Y/N? =	n
Early Life Stages Present Y/N? =	y

Stream Flows

1Q10 (Annual) =	0.21 MGD
7Q10 (Annual) =	0.44 MGD
30Q10 (Annual) =	1.3 MGD
1Q10 (Wet season) =	3.23 MGD
30Q10 (Wet season)	6.3 MGD
30Q5 =	2.2 MGD
Harmonic Mean =	5.4 MGD

Mixing Information

Annual - 1Q10 Mix =	100 %
- 7Q10 Mix =	100 %
- 30Q10 Mix =	100 %
Wet Season - 1Q10 Mix =	100 %
- 30Q10 Mix =	100 %

Effluent Information

Mean Hardness (as CaCO3) =	123 mg/L
90% Temp (Annual) =	26 deg C
90% Temp (Wet season) =	deg C
90% Maximum pH =	7.3 SU
10% Maximum pH =	SU
Discharge Flow =	67 MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	9.9E+02	--	--	na	1.0E+03	--	--	--	--	--	--	--	--	--	--	na	1.0E+0
Acrolein	0	--	--	na	9.3E+00	--	--	na	9.6E+00	--	--	--	--	--	--	--	--	--	--	na	9.6E+0
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	2.7E+00	--	--	--	--	--	--	--	--	--	--	na	2.7E+0
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	3.0E+00	--	na	5.4E-04	--	--	--	--	--	--	--	--	3.0E+00	--	na	5.4E-0
Ammonia-N (mg/l) (Yearly)	0	2.62E+01	2.43E+00	na	--	2.63E+01	2.47E+00	na	--	--	--	--	--	--	--	--	--	2.63E+01	2.47E+00	na	--
Ammonia-N (mg/l) (High Flow)	0	2.61E+01	5.05E+00	na	--	2.73E+01	5.52E+00	na	--	--	--	--	--	--	--	--	--	2.73E+01	5.52E+00	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	4.1E+04	--	--	--	--	--	--	--	--	--	--	na	4.1E+0
Antimony	0	--	--	na	6.4E+02	--	--	na	6.6E+02	--	--	--	--	--	--	--	--	--	--	na	6.6E+0
Arsenic	0	3.4E+02	1.5E+02	na	--	3.4E+02	1.5E+02	na	--	--	--	--	--	--	--	--	--	3.4E+02	1.5E+02	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	5.5E+02	--	--	--	--	--	--	--	--	--	--	na	5.5E+0
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	2.2E-03	--	--	--	--	--	--	--	--	--	--	na	2.2E-0
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-0
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-0
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-0
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-0
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	5.7E+00	--	--	--	--	--	--	--	--	--	--	na	5.7E+0
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	6.7E+04	--	--	--	--	--	--	--	--	--	--	na	6.7E+0
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	--	--	na	2.4E+0
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	1.5E+03	--	--	--	--	--	--	--	--	--	--	na	1.5E+0
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	2.0E+03	--	--	--	--	--	--	--	--	--	--	na	2.0E+0
Cadmium	0	4.9E+00	1.3E+00	na	--	5.0E+00	1.3E+00	na	--	--	--	--	--	--	--	--	--	5.0E+00	1.3E+00	na	--
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	1.7E+01	--	--	--	--	--	--	--	--	--	--	na	1.7E+0
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	2.4E+00	4.3E-03	na	8.8E-03	--	--	--	--	--	--	--	--	2.4E+00	4.3E-03	na	8.8E-0
Chloride	0	8.6E+05	2.3E+05	na	--	8.6E+05	2.3E+05	na	--	--	--	--	--	--	--	--	--	8.6E+05	2.3E+05	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.9E+01	1.1E+01	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	--	--	na	1.7E+0

Attachment 6

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[c]	0	--	--	na	1.3E+02	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	--	--	na	1.4E+0
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	--	--	na	1.1E+0
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	--	--	na	1.7E+0
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	na	1.5E+0
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.3E-02	4.1E-02	na	--	--	--	--	--	--	--	--	--	8.3E-02	4.1E-02	na	--
Chromium III	0	6.7E+02	8.7E+01	na	--	6.8E+02	8.8E+01	na	--	--	--	--	--	--	--	--	--	6.8E+02	8.8E+01	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.6E+01	1.1E+01	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene[c]	0	--	--	na	1.8E-02	--	--	na	1.9E-02	--	--	--	--	--	--	--	--	--	--	na	1.9E-0
Copper	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.6E+01	1.1E+01	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.2E+01	5.2E+00	na	1.7E+04	--	--	--	--	--	--	--	--	2.2E+01	5.2E+00	na	1.7E+0
DDD[c]	0	--	--	na	3.1E-03	--	--	na	3.3E-03	--	--	--	--	--	--	--	--	--	--	na	3.3E-0
DDE[c]	0	--	--	na	2.2E-03	--	--	na	2.4E-03	--	--	--	--	--	--	--	--	--	--	na	2.4E-0
DDT[c]	0	1.1E+00	1.0E-03	na	2.2E-03	1.1E+00	1.0E-03	na	2.4E-03	--	--	--	--	--	--	--	--	1.1E+00	1.0E-03	na	2.4E-0
Demeton	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.7E-01	1.7E-01	na	--	--	--	--	--	--	--	--	--	1.7E-01	1.7E-01	na	--
Dibenz(a,h)anthracene[c]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-0
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	1.3E+03	--	--	--	--	--	--	--	--	--	--	na	1.3E+0
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	9.9E+02	--	--	--	--	--	--	--	--	--	--	na	9.9E+0
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	2.0E+02	--	--	--	--	--	--	--	--	--	--	na	2.0E+0
3,3-Dichlorobenzidine[c]	0	--	--	na	2.8E-01	--	--	na	3.0E-01	--	--	--	--	--	--	--	--	--	--	na	3.0E-0
Dichlorobromomethane[c]	0	--	--	na	1.7E+02	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	--	--	na	1.8E+0
1,2-Dichloroethane[c]	0	--	--	na	3.7E+02	--	--	na	4.0E+02	--	--	--	--	--	--	--	--	--	--	na	4.0E+0
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	7.3E+03	--	--	--	--	--	--	--	--	--	--	na	7.3E+0
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.0E+04	--	--	--	--	--	--	--	--	--	--	na	1.0E+0
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	--	--	na	3.0E+0
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[c]	0	--	--	na	1.5E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	--	--	na	1.6E+0
1,3-Dichloropropene[c]	0	--	--	na	2.1E+02	--	--	na	2.3E+02	--	--	--	--	--	--	--	--	--	--	na	2.3E+0
Dieldrin[c]	0	2.4E-01	5.6E-02	na	5.4E-04	2.4E-01	5.6E-02	na	5.8E-04	--	--	--	--	--	--	--	--	2.4E-01	5.6E-02	na	5.8E-0
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	4.5E+04	--	--	--	--	--	--	--	--	--	--	na	4.5E+0
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	8.8E+02	--	--	--	--	--	--	--	--	--	--	na	8.8E+0
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.1E+06	--	--	--	--	--	--	--	--	--	--	na	1.1E+0
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	4.6E+03	--	--	--	--	--	--	--	--	--	--	na	4.6E+0
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	5.5E+03	--	--	--	--	--	--	--	--	--	--	na	5.5E+0
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	2.9E+02	--	--	--	--	--	--	--	--	--	--	na	2.9E+0
2,4-Dinitrotoluene[c]	0	--	--	na	3.4E+01	--	--	na	3.7E+01	--	--	--	--	--	--	--	--	--	--	na	3.7E+0
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	5.3E-08	--	--	--	--	--	--	--	--	--	--	na	5.3E-0
1,2-Diphenylhydrazine[c]	0	--	--	na	2.0E+00	--	--	na	2.2E+00	--	--	--	--	--	--	--	--	--	--	na	2.2E+0
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	9.2E+01	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	na	9.2E+0
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	9.2E+01	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	na	9.2E+0
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.2E-01	5.6E-02	--	--	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	9.2E+01	--	--	--	--	--	--	--	--	--	--	na	9.2E+0
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	8.6E-02	3.6E-02	na	6.2E-02	--	--	--	--	--	--	--	--	8.6E-02	3.6E-02	na	6.2E-0
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	3.1E-01	--	--	--	--	--	--	--	--	--	--	na	3.1E-0

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	2.2E+03	--	--	--	--	--	--	--	--	--	--	na	2.2E+0
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	--	--	na	1.4E+0
Fluorene	0	--	--	na	5.3E+03	--	--	na	5.5E+03	--	--	--	--	--	--	--	--	--	--	na	5.5E+0
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.0E-02	na	--	--	--	--	--	--	--	--	--	--	1.0E-02	na	--
Heptachlor ^c	0	5.2E-01	3.8E-03	na	7.9E-04	5.2E-01	3.8E-03	na	8.5E-04	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	na	8.5E-0
Heptachlor Epoxide ^c	0	5.2E-01	3.8E-03	na	3.9E-04	5.2E-01	3.8E-03	na	4.2E-04	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	na	4.2E-0
Hexachlorobenzene ^c	0	--	--	na	2.9E-03	--	--	na	3.1E-03	--	--	--	--	--	--	--	--	--	--	na	3.1E-0
Hexachlorobutadiene ^c	0	--	--	na	1.8E+02	--	--	na	1.9E+02	--	--	--	--	--	--	--	--	--	--	na	1.9E+0
Hexachlorocyclohexane Alpha-BHC ^c	0	--	--	na	4.9E-02	--	--	na	5.3E-02	--	--	--	--	--	--	--	--	--	--	na	5.3E-0
Hexachlorocyclohexane Beta-BHC ^c	0	--	--	na	1.7E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-0
Hexachlorocyclohexane Gamma-BHC ^c (Lindane)	0	9.5E-01	na	na	1.8E+00	9.5E-01	--	na	1.9E+00	--	--	--	--	--	--	--	--	9.5E-01	--	na	1.9E+0
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.1E+03	--	--	--	--	--	--	--	--	--	--	na	1.1E+0
Hexachloroethane ^c	0	--	--	na	3.3E+01	--	--	na	3.6E+01	--	--	--	--	--	--	--	--	--	--	na	3.6E+0
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+00	na	--	--	--	--	--	--	--	--	--	--	2.0E+00	na	--
Indeno (1,2,3-cd) pyrene ^c	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-0
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone ^c	0	--	--	na	9.6E+03	--	--	na	1.0E+04	--	--	--	--	--	--	--	--	--	--	na	1.0E+0
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	1.5E+02	1.7E+01	na	--	1.5E+02	1.8E+01	na	--	--	--	--	--	--	--	--	--	1.5E+02	1.8E+01	na	--
Malathion	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.4E+00	7.8E-01	--	--	--	--	--	--	--	--	--	--	1.4E+00	7.8E-01	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	1.5E+03	--	--	--	--	--	--	--	--	--	--	na	1.5E+0
Methylene Chloride ^c	0	--	--	na	5.9E+03	--	--	na	6.4E+03	--	--	--	--	--	--	--	--	--	--	na	6.4E+0
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E-02	na	--	--	--	--	--	--	--	--	--	--	3.0E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Nickel	0	2.2E+02	2.4E+01	na	4.6E+03	2.2E+02	2.4E+01	na	4.8E+03	--	--	--	--	--	--	--	--	2.2E+02	2.4E+01	na	4.8E+0
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	7.1E+02	--	--	--	--	--	--	--	--	--	--	na	7.1E+0
N-Nitrosodimethylamine ^c	0	--	--	na	3.0E+01	--	--	na	3.2E+01	--	--	--	--	--	--	--	--	--	--	na	3.2E+0
N-Nitrosodiphenylamine ^c	0	--	--	na	6.0E+01	--	--	na	6.5E+01	--	--	--	--	--	--	--	--	--	--	na	6.5E+0
N-Nitrosodi-n-propylamine ^c	0	--	--	na	5.1E+00	--	--	na	5.5E+00	--	--	--	--	--	--	--	--	--	--	na	5.5E+0
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.8E+01	6.6E+00	na	--	--	--	--	--	--	--	--	--	2.8E+01	6.6E+00	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	6.5E-02	1.3E-02	na	--	--	--	--	--	--	--	--	--	6.5E-02	1.3E-02	na	--
PCB Total ^c	0	--	1.4E-02	na	6.4E-04	--	1.4E-02	na	6.9E-04	--	--	--	--	--	--	--	--	--	1.4E-02	na	6.9E-0
Pentachlorophenol ^c	0	7.7E-03	5.9E-03	na	3.0E+01	7.7E-03	5.9E-03	na	3.2E+01	--	--	--	--	--	--	--	--	7.7E-03	5.9E-03	na	3.2E+0
Phenol	0	--	--	na	8.6E+05	--	--	na	8.9E+05	--	--	--	--	--	--	--	--	--	--	na	8.9E+0
Pyrene	0	--	--	na	4.0E+03	--	--	na	4.1E+03	--	--	--	--	--	--	--	--	--	--	na	4.1E+0
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	4.1E+00	--	--	--	--	--	--	--	--	--	--	na	4.1E+0
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.0E+01	5.0E+00	na	4.3E+03	--	--	--	--	--	--	--	--	**2.0E+01**	**5.0E+00**	**na**	**4.3E+0**
Silver	0	4.9E+00	--	na	--	4.9E+00	--	na	--	--	--	--	--	--	--	--	--	**4.9E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	4.3E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.3E+0**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	3.6E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.6E+0**
Thallium	0	--	--	na	4.7E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-0**
Toluene	0	--	--	na	6.0E+03	--	--	na	6.2E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.2E+0**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	7.3E-01	2.0E-04	na	3.0E-03	--	--	--	--	--	--	--	--	**7.3E-01**	**2.0E-04**	**na**	**3.0E-0**
Tributyltin	0	4.6E-01	7.2E-02	na	--	4.6E-01	7.2E-02	na	--	--	--	--	--	--	--	--	--	**4.6E-01**	**7.2E-02**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	7.2E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.2E+0**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+0**
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	3.2E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.2E+0**
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	2.6E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+0**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	2.6E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+0**
Zinc	0	1.4E+02	1.4E+02	na	2.6E+04	1.4E+02	1.4E+02	na	2.7E+04	--	--	--	--	--	--	--	--	**1.4E+02**	**1.4E+02**	**na**	**2.7E+0**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	6.6E+02
Arsenic	9.1E+01
Barium	na
Cadmium	8.0E-01
Chromium III	5.3E+01
Chromium VI	6.4E+00
Copper	6.4E+00
Iron	na
Lead	1.1E+01
Manganese	na
Mercury	4.7E-01
Nickel	1.5E+01
Selenium	3.0E+00
Silver	2.0E+00
Zinc	5.6E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Noman M. Cole Jr PCP (November - March)(High Flow)Permit No.: VA0025364

Receiving Stream: Pohick Creek

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		Stream Flows		Mixing Information		Effluent Information	
Mean Hardness (as CaCO3) =	42 mg/L	1Q10 (Annual) =	3.23 MGD	Annual - 1Q10 Mix =	100 %	Mean Hardness (as CaCO3) =	87 mg/L
90% Temperature (Annual) =	16.9 deg C	7Q10 (Annual) =	3.94 MGD	- 7Q10 Mix =	100 %	90% Temp (Annual) =	deg C
90% Temperature (Wet season) =	16.9 deg C	30Q10 (Annual) =	1.3 MGD	- 30Q10 Mix =	100 %	90% Temp (Wet season) =	21 deg C
90% Maximum pH =	8.01 SU	1Q10 (Wet season) =	3.23 MGD	Wet Season - 1Q10 Mix =	100 %	90% Maximum pH =	7.1 SU
10% Maximum pH =	SU	30Q10 (Wet season)	6.3 MGD	- 30Q10 Mix =	100 %	10% Maximum pH =	SU
Tier Designation (1 or 2) =	1	30Q5 =	2.2 MGD			Discharge Flow =	67 MGD
Public Water Supply (PWS) Y/N? =	n	Harmonic Mean =	5.4 MGD				
Trout Present Y/N? =	n						
Early Life Stages Present Y/N? =	y						

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	9.9E+02	--	--	na	1.0E+03	--	--	--	--	--	--	--	--	--	--	na	1.0E+03
Acrolein	0	--	--	na	9.3E+00	--	--	na	9.6E+00	--	--	--	--	--	--	--	--	--	--	na	9.6E+00
Acrylonitrile[C]	0	--	--	na	2.5E+00	--	--	na	2.7E+00	--	--	--	--	--	--	--	--	--	--	na	2.7E+00
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	3.1E+00	--	na	5.4E-04	--	--	--	--	--	--	--	--	3.1E+00	--	na	5.4E-04
Ammonia-N (mg/l) (Yearly)	0	3.23E+01	5.65E+00	na	--	3.38E+01	5.76E+00	na	--	--	--	--	--	--	--	--	--	3.38E+01	5.76E+00	na	--
Ammonia-N (mg/l) (High Flow)	0	3.23E+01	3.76E+00	na	--	3.38E+01	4.11E+00	na	--	--	--	--	--	--	--	--	--	3.38E+01	4.11E+00	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	4.1E+04	--	--	--	--	--	--	--	--	--	--	na	4.1E+04
Antimony	0	--	--	na	6.4E+02	--	--	na	6.6E+02	--	--	--	--	--	--	--	--	--	--	na	6.6E+02
Arsenic	0	3.4E+02	1.5E+02	na	--	3.6E+02	1.6E+02	na	--	--	--	--	--	--	--	--	--	3.6E+02	1.6E+02	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	5.5E+02	--	--	--	--	--	--	--	--	--	--	na	5.5E+02
Benzidine[C]	0	--	--	na	2.0E-03	--	--	na	2.2E-03	--	--	--	--	--	--	--	--	--	--	na	2.2E-03
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-01
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-01
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-01
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-01
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	5.7E+00	--	--	--	--	--	--	--	--	--	--	na	5.7E+00
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	6.7E+04	--	--	--	--	--	--	--	--	--	--	na	6.7E+04
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	--	--	na	2.4E+01
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	1.5E+03	--	--	--	--	--	--	--	--	--	--	na	1.5E+03
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	2.0E+03	--	--	--	--	--	--	--	--	--	--	na	2.0E+03
Cadmium	0	3.3E+00	9.9E-01	na	--	3.4E+00	1.1E+00	na	--	--	--	--	--	--	--	--	--	3.4E+00	1.1E+00	na	--
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	1.7E+01	--	--	--	--	--	--	--	--	--	--	na	1.7E+01
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	2.5E+00	4.6E-03	na	8.8E-03	--	--	--	--	--	--	--	--	2.5E+00	4.6E-03	na	8.8E-03
Chloride	0	8.6E+05	2.3E+05	na	--	9.0E+05	2.4E+05	na	--	--	--	--	--	--	--	--	--	9.0E+05	2.4E+05	na	--
TRC	0	1.9E+01	1.1E+01	na	--	2.0E+01	1.2E+01	na	--	--	--	--	--	--	--	--	--	2.0E+01	1.2E+01	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	--	--	na	1.7E+03

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	--	--	na	1.4E+02
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	--	--	na	1.1E+04
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	--	--	na	1.7E+03
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	na	1.5E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.7E-02	4.3E-02	na	--	--	--	--	--	--	--	--	--	8.7E-02	4.3E-02	na	--
Chromium III	0	5.0E+02	6.5E+01	na	--	5.2E+02	6.8E+01	na	--	--	--	--	--	--	--	--	--	5.2E+02	6.8E+01	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.7E+01	1.2E+01	na	--	--	--	--	--	--	--	--	--	1.7E+01	1.2E+01	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene [C]	0	--	--	na	1.8E-02	--	--	na	1.9E-02	--	--	--	--	--	--	--	--	--	--	na	1.9E-02
Copper	0	1.2E+01	7.8E+00	na	--	1.2E+01	8.2E+00	na	--	--	--	--	--	--	--	--	--	1.2E+01	8.2E+00	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.3E+01	5.5E+00	na	1.7E+04	--	--	--	--	--	--	--	--	2.3E+01	5.5E+00	na	1.7E+04
DDD [C]	0	--	--	na	3.1E-03	--	--	na	3.3E-03	--	--	--	--	--	--	--	--	--	--	na	3.3E-03
DDE [C]	0	--	--	na	2.2E-03	--	--	na	2.4E-03	--	--	--	--	--	--	--	--	--	--	na	2.4E-03
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.2E+00	1.1E-03	na	2.4E-03	--	--	--	--	--	--	--	--	1.2E+00	1.1E-03	na	2.4E-03
Demeton	0	--	1.0E-01	na	--	--	1.1E-01	na	--	--	--	--	--	--	--	--	--	--	1.1E-01	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.8E-01	1.8E-01	na	--	--	--	--	--	--	--	--	--	1.8E-01	1.8E-01	na	--
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-01
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	1.3E+03	--	--	--	--	--	--	--	--	--	--	na	1.3E+03
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	9.9E+02	--	--	--	--	--	--	--	--	--	--	na	9.9E+02
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	2.0E+02	--	--	--	--	--	--	--	--	--	--	na	2.0E+02
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	3.0E-01	--	--	--	--	--	--	--	--	--	--	na	3.0E-01
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	--	--	na	1.8E+02
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	4.0E+02	--	--	--	--	--	--	--	--	--	--	na	4.0E+02
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	7.3E+03	--	--	--	--	--	--	--	--	--	--	na	7.3E+03
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.0E+04	--	--	--	--	--	--	--	--	--	--	na	1.0E+04
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	--	--	na	3.0E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	--	--	na	1.6E+02
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	2.3E+02	--	--	--	--	--	--	--	--	--	--	na	2.3E+02
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	2.5E-01	5.9E-02	na	5.8E-04	--	--	--	--	--	--	--	--	2.5E-01	5.9E-02	na	5.8E-04
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	4.5E+04	--	--	--	--	--	--	--	--	--	--	na	4.5E+04
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	8.8E+02	--	--	--	--	--	--	--	--	--	--	na	8.8E+02
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.1E+06	--	--	--	--	--	--	--	--	--	--	na	1.1E+06
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	4.6E+03	--	--	--	--	--	--	--	--	--	--	na	4.6E+03
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	5.5E+03	--	--	--	--	--	--	--	--	--	--	na	5.5E+03
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	2.9E+02	--	--	--	--	--	--	--	--	--	--	na	2.9E+02
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	3.7E+01	--	--	--	--	--	--	--	--	--	--	na	3.7E+01
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	5.3E-08	--	--	--	--	--	--	--	--	--	--	na	5.3E-08
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	2.2E+00	--	--	--	--	--	--	--	--	--	--	na	2.2E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.3E-01	5.9E-02	na	9.2E+01	--	--	--	--	--	--	--	--	2.3E-01	5.9E-02	na	9.2E+01
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.3E-01	5.9E-02	na	9.2E+01	--	--	--	--	--	--	--	--	2.3E-01	5.9E-02	na	9.2E+01
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.3E-01	5.9E-02	--	--	--	--	--	--	--	--	--	--	2.3E-01	5.9E-02	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	9.2E+01	--	--	--	--	--	--	--	--	--	--	na	9.2E+01
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	9.0E-02	3.8E-02	na	6.2E-02	--	--	--	--	--	--	--	--	9.0E-02	3.8E-02	na	6.2E-02
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	3.1E-01	--	--	--	--	--	--	--	--	--	--	na	3.1E-01

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	2.2E+03	--	--	--	--	--	--	--	--	--	--	na	2.2E+03
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	--	--	na	1.4E+02
Fluorene	0	--	--	na	5.3E+03	--	--	na	5.5E+03	--	--	--	--	--	--	--	--	--	--	na	5.5E+03
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.1E-02	na	--	--	--	--	--	--	--	--	--	--	1.1E-02	na	--
Heptachlor [c]	0	5.2E-01	3.8E-03	na	7.9E-04	5.5E-01	4.0E-03	na	8.5E-04	--	--	--	--	--	--	--	--	5.5E-01	4.0E-03	na	8.5E-04
Heptachlor Epoxide [c]	0	5.2E-01	3.8E-03	na	3.9E-04	5.5E-01	4.0E-03	na	4.2E-04	--	--	--	--	--	--	--	--	5.5E-01	4.0E-03	na	4.2E-04
Hexachlorobenzene [c]	0	--	--	na	2.9E-03	--	--	na	3.1E-03	--	--	--	--	--	--	--	--	--	--	na	3.1E-03
Hexachlorobutadiene [c]	0	--	--	na	1.8E+02	--	--	na	1.9E+02	--	--	--	--	--	--	--	--	--	--	na	1.9E+02
Hexachlorocyclohexane Alpha-BHC [c]	0	--	--	na	4.9E-02	--	--	na	5.3E-02	--	--	--	--	--	--	--	--	--	--	na	5.3E-02
Hexachlorocyclohexane Beta-BHC [c]	0	--	--	na	1.7E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Hexachlorocyclohexane Gamma-BHC [c] (Lindane)	0	9.5E-01	na	na	1.8E+00	1.0E+00	--	na	1.9E+00	--	--	--	--	--	--	--	--	1.0E+00	--	na	1.9E+00
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.1E+03	--	--	--	--	--	--	--	--	--	--	na	1.1E+03
Hexachloroethane [c]	0	--	--	na	3.3E+01	--	--	na	3.6E+01	--	--	--	--	--	--	--	--	--	--	na	3.6E+01
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.1E+00	na	--	--	--	--	--	--	--	--	--	--	2.1E+00	na	--
Indeno (1,2,3-cd) pyrene [c]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone [c]	0	--	--	na	9.6E+03	--	--	na	1.0E+04	--	--	--	--	--	--	--	--	--	--	na	1.0E+04
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	9.7E+01	1.1E+01	na	--	1.0E+02	1.2E+01	na	--	--	--	--	--	--	--	--	--	1.0E+02	1.2E+01	na	--
Malathion	0	--	1.0E-01	na	--	--	1.1E-01	na	--	--	--	--	--	--	--	--	--	--	1.1E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.5E+00	8.2E-01	--	--	--	--	--	--	--	--	--	--	1.5E+00	8.2E-01	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	1.5E+03	--	--	--	--	--	--	--	--	--	--	na	1.5E+03
Methylene Chloride [c]	0	--	--	na	5.9E+03	--	--	na	6.4E+03	--	--	--	--	--	--	--	--	--	--	na	6.4E+03
Methoxychlor	0	--	3.0E-02	na	--	--	3.2E-02	na	--	--	--	--	--	--	--	--	--	--	3.2E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Nickel	0	1.6E+02	1.8E+01	na	4.6E+03	1.7E+02	1.9E+01	na	4.8E+03	--	--	--	--	--	--	--	--	1.7E+02	1.9E+01	na	4.8E+03
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	7.1E+02	--	--	--	--	--	--	--	--	--	--	na	7.1E+02
N-Nitrosodimethylamine [c]	0	--	--	na	3.0E+01	--	--	na	3.2E+01	--	--	--	--	--	--	--	--	--	--	na	3.2E+01
N-Nitrosodiphenylamine [c]	0	--	--	na	6.0E+01	--	--	na	6.5E+01	--	--	--	--	--	--	--	--	--	--	na	6.5E+01
N-Nitrosodi-n-propylamine [c]	0	--	--	na	5.1E+00	--	--	na	5.5E+00	--	--	--	--	--	--	--	--	--	--	na	5.5E+00
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.9E+01	7.0E+00	na	--	--	--	--	--	--	--	--	--	2.9E+01	7.0E+00	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	6.8E-02	1.4E-02	na	--	--	--	--	--	--	--	--	--	6.8E-02	1.4E-02	na	--
PCB Total [c]	0	--	1.4E-02	na	6.4E-04	--	1.5E-02	na	6.9E-04	--	--	--	--	--	--	--	--	--	1.5E-02	na	6.9E-04
Pentachlorophenol [c]	0	7.7E-03	5.9E-03	na	3.0E+01	8.1E-03	6.2E-03	na	3.2E+01	--	--	--	--	--	--	--	--	8.1E-03	6.2E-03	na	3.2E+01
Phenol	0	--	--	na	8.6E+05	--	--	na	8.9E+05	--	--	--	--	--	--	--	--	--	--	na	8.9E+05
Pyrene	0	--	--	na	4.0E+03	--	--	na	4.1E+03	--	--	--	--	--	--	--	--	--	--	na	4.1E+03
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	4.1E+00	--	--	--	--	--	--	--	--	--	--	na	4.1E+00
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.1E+01	5.3E+00	na	4.3E+03	--	--	--	--	--	--	--	--	**2.1E+01**	**5.3E+00**	**na**	**4.3E+03**
Silver	0	2.6E+00	--	na	--	2.7E+00	--	na	--	--	--	--	--	--	--	--	--	**2.7E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane^C	0	--	--	na	4.0E+01	--	--	na	4.3E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.3E+01**
Tetrachloroethylene^C	0	--	--	na	3.3E+01	--	--	na	3.6E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.6E+01**
Thallium	0	--	--	na	4.7E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.9E-01**
Toluene	0	--	--	na	6.0E+03	--	--	na	6.2E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.2E+03**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene ^{C}	0	7.3E-01	2.0E-04	na	2.8E-03	7.7E-01	2.1E-04	na	3.0E-03	--	--	--	--	--	--	--	--	**7.7E-01**	**2.1E-04**	**na**	**3.0E-03**
Tributyltin	0	4.6E-01	7.2E-02	na	--	4.8E-01	7.6E-02	na	--	--	--	--	--	--	--	--	--	**4.8E-01**	**7.6E-02**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	7.2E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.2E+01**
1,1,2-Trichloroethane^C	0	--	--	na	1.6E+02	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.7E+02**
Trichloroethylene ^{C}	0	--	--	na	3.0E+02	--	--	na	3.2E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.2E+02**
2,4,6-Trichlorophenol ^{C}	0	--	--	na	2.4E+01	--	--	na	2.6E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride^C	0	--	--	na	2.4E+01	--	--	na	2.6E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.6E+01**
Zinc	0	1.0E+02	1.0E+02	na	2.6E+04	1.1E+02	1.1E+02	na	2.7E+04	--	--	--	--	--	--	--	--	**1.1E+02**	**1.1E+02**	**na**	**2.7E+04**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information. Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	6.6E+02
Arsenic	9.5E+01
Barium	na
Cadmium	6.3E-01
Chromium III	4.1E+01
Chromium VI	6.7E+00
Copper	4.8E+00
Iron	na
Lead	6.9E+00
Manganese	na
Mercury	4.9E-01
Nickel	1.1E+01
Selenium	3.2E+00
Silver	1.1E+00
Zinc	4.3E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

```
Mixing Zone Predictions for            Noman Cole (high flows)

Effluent Flow = 67 MGD                            July 22, 2008 JCC
Stream 7Q10   = 3.94 MGD
Stream 30Q10 = 9.8 MGD
Stream 1Q10   = 3.23 MGD
Stream slope  = 0.001 ft/ft
Stream width  = 35 ft
Bottom scale  =  2
Channel scale =  1

----------------------------------------------------

Mixing Zone Predictions @ 7Q10

Depth          = 2.881 ft
Length         = 603.96 ft
Velocity       = 1.0816 ft/sec
Residence Time = .0065 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10
may be used.

---------------------------------------------------

Mixing Zone Predictions @ 30Q10

Depth          = 3.0514 ft
Length         = 570.27 ft
Velocity       = 1.1132 ft/sec
Residence Time = .0059 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10
may be used.

----------------------------------------------------

Mixing Zone Predictions @ 1Q10

Depth          = 2.8824 ft
Length         = 601.3 ft
Velocity       = 1.0776 ft/sec
Residence Time = .155 hours

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 1Q10
may be used.

  ----------------------------------------------------

  Virginia DEQ Mixing Zone Analysis Version 2.1
```

```
Mixing Zone Predictions for           Noman Cole (Low Flows)

Effluent Flow = 67 MGD                      July 22, 2008 JCC
Stream 7Q10   = 0.44 MGD
Stream 30Q10 = 1.3 MGD
Stream 1Q10   = 0.21 MGD
Stream slope  = 0.001 ft/ft
Stream width  = 35 ft
Bottom scale  =  2
Channel scale =  1

---------------------------------------------------

Mixing Zone Predictions @ 7Q10

Depth          = 2.8091 ft
Length         = 615.82 ft
Velocity       = 1.0618 ft/sec
Residence Time = .0067 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10
may be used.

---------------------------------------------------

Mixing Zone Predictions @ 30Q10

Depth          = 2.8318 ft
Length         = 611.27 ft
Velocity       = 1.0667 ft/sec
Residence Time = .0066 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10
may be used.

---------------------------------------------------

Mixing Zone Predictions @ 1Q10

Depth          = 2.803 ft
Length         = 617.06 ft
Velocity       = 1.0605 ft/sec
Residence Time = .1616 hours

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 1Q10
may be used.

---------------------------------------------------

  Virginia DEQ Mixing Zone Analysis Version 2.1
```

Appendix A

Hardness		
5/21/2002	126	
7/5/2002	144	
9/23/2002	154	2002 Permit App
7/14/2003	106	
7/15/2003	92	
7/16/2003	111	
7/17/2003	110	
7/18/2003	118	
7/19/2003	118	
7/20/2003	120	
7/21/2003	116	Local Limits Determi
12/19/2006	87	
5/30/2007	106	
6/25/2007	161	
9/5/2007	144	2007 Permit App
	121	Average Hardness
April - October		
5/21/2002	126	
7/5/2002	144	
9/23/2002	154	
7/14/2003	106	
7/15/2003	92	
7/16/2003	111	
7/17/2003	110	
7/18/2003	118	
7/19/2003	118	
7/20/2003	120	
7/21/2003	116	
5/30/2007	106	
6/25/2007	161	
9/5/2007	144	
	123	Average Hardness
November through March		
12/19/2006	87	

Noman M. Cole, Jr. Pollution Control Plant
November - March
2003-2008

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
2003	11					
		11/01/03	7.3	23	7.4	23
		11/02/03	7.1	22	7.4	23
		11/03/03	7.4	22	7.4	23
		11/04/03	7.2	22	7.4	23
		11/05/03	7.2	23	7.4	23
		11/06/03	7.1	23	7.4	23
		11/07/03	7.0	22	7.4	23
		11/08/03	7.0	21	7.4	23
		11/09/03	7.1	21	7.3	22
		11/10/03	7.2	21	7.3	22
		11/11/03	7.1	21	7.3	22
		11/12/03	7.3	21	7.3	22
		11/13/03	7.3	21	7.3	22
		11/14/03	7.1	19	7.3	22
		11/15/03	7.1	20	7.3	22
		11/16/03	7.1	21	7.3	22
		11/17/03	6.9	21	7.3	22
		11/18/03	7.3	21	7.3	22
		11/19/03	7.2	21	7.3	22
		11/20/03	7.0	21	7.3	22
		11/21/03	6.8	20	7.3	22
		11/22/03	7.1	20	7.3	22
		11/23/03	7.1	20	7.3	22
		11/24/03	7.2	21	7.3	22
		11/25/03	7.4	20	7.3	22
		11/26/03	6.9	20	7.2	22
		11/27/03	7.3	20	7.2	22
		11/28/03	7.3	21	7.2	22
		11/29/03	7.0	20	7.2	22
		11/30/03	7.0	19	7.2	22
	12				7.2	22
		12/01/03	7.0	20	7.2	22
		12/02/03	7.1	20	7.2	22
		12/03/03	7.4	19	7.2	22
		12/04/03	7.3	19	7.2	22
		12/05/03	7.1	19	7.2	22
		12/06/03	6.9	18	7.2	22
		12/07/03	6.9	18	7.2	22
		12/08/03	7.1	18	7.2	22
		12/09/03	7.0	19	7.2	22
		12/10/03	7.0	19	7.2	22
		12/11/03	7.0	19	7.2	22
		12/12/03	6.9	18	7.2	22
		12/13/03	7.1	18	7.2	22
		12/14/03	6.9	17	7.2	22
		12/15/03	6.9	17	7.2	22
		12/16/03	6.4	17	7.2	22
		12/17/03	6.6	18	7.2	22
		12/18/03	6.6	17	7.2	21
		12/19/03	6.9	17	7.2	21
		12/20/03	6.5	17	7.2	21
		12/21/03	6.7	17	7.2	21
		12/22/03	6.7	18	7.2	21
		12/23/03	6.9	18	7.2	21
		12/24/03	6.9	18	7.2	21
		12/25/03	6.8	17	7.2	21
		12/26/03	6.9	17	7.2	21
		12/27/03	7.2	17	7.2	21
		12/28/03	7.0	17	7.2	21
		12/29/03	6.9	17	7.2	21
		12/30/03	6.9	18	7.2	21
		12/31/03	6.9	18	7.2	21
2004					7.2	21
	1				7.2	21
		01/01/04	6.9	17	7.2	21
		01/02/04	6.9	18	7.2	21
		01/03/04	7.3	19	7.2	21
		01/04/04	7.3	19	7.2	21
		01/05/04	7.0	19	7.2	21

Noman M. Cole, Jr. Pollution Control Plant
November - March
2003-2008

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH		Sorted Temperature	
		01/06/04	7.0	18	7.2		21	
		01/07/04	6.8	17	7.1		21	
		01/08/04	7.1	17	7.1		21	
		01/09/04	7.0	17	7.1	90th percentile	21	90th percentile
		01/10/04	6.8	16	7.1		21	
		01/11/04	6.9	16	7.1		21	
		01/12/04	6.8	17	7.1		21	
		01/13/04	6.9	17	7.1		21	
		01/14/04	6.8	17	7.1		21	
		01/15/04	6.8	17	7.1		21	
		01/16/04	7.0	16	7.1		21	
		01/17/04	7.0	16	7.1		21	
		01/18/04	7.1	16	7.1		21	
		01/19/04	6.8	16	7.1		21	
		01/20/04	6.8	16	7.1		21	
		01/21/04	6.8	15	7.1		21	
		01/22/04	6.8	16	7.1		21	
		01/23/04	6.8	15	7.1		21	
		01/24/04	6.9	15	7.1		21	
		01/25/04	6.8	15	7.1		21	
		01/26/04	6.7	15	7.1		21	
		01/27/04	7.0	16	7.1		21	
		01/28/04	6.8	16	7.1		21	
		01/29/04	6.7	15	7.1		21	
		01/30/04	7.0	16	7.1		21	
		01/31/04	7.0	15	7.1		21	
	2				7.1		21	
		02/01/04	7.0	15	7.1		21	
		02/02/04	6.7	16	7.1		21	
		02/03/04	6.8	16	7.1		21	
		02/04/04	6.7	18	7.1		21	
		02/05/04	6.7	16	7.1		21	
		02/06/04	6.7	16	7.1		21	
		02/07/04	6.8	14	7.1		20	
		02/08/04	6.7	14	7.1		20	
		02/09/04	6.7	14	7.1		20	
		02/10/04	6.7	15	7.1		20	
		02/11/04	6.7	16	7.1		20	
		02/12/04	6.5	16	7.1		20	
		02/13/04	6.6	16	7.1		20	
		02/14/04	6.9	15	7.1		20	
		02/15/04	6.9	16	7.1		20	
		02/16/04	6.7	14	7.1		20	
		02/17/04	6.6	15	7.1		20	
		02/18/04	6.5	15	7.1		20	
		02/19/04	6.7	15	7.1		20	
		02/20/04	6.7	15	7.1		20	
		02/21/04	7.0	16	7.1		20	
		02/22/04	6.9	15	7.1		20	
		02/23/04	6.8	15	7.1		20	
		02/24/04	6.9	16	7.1		20	
		02/25/04	6.9	16	7.1		20	
		02/26/04	6.8	16	7.1		20	
		02/27/04	6.7	15	7.1		20	
		02/28/04	6.9	16	7.1		20	
		02/29/04	6.9	16	7.1		20	
	3				7.1		20	
		03/01/04	6.8	16	7.1		20	
		03/02/04	6.8	17	7.1		20	
		03/03/04	6.4	17	7.1		20	
		03/04/04	6.7	17	7.1		20	
		03/05/04	6.9	17	7.1		20	
		03/06/04	7.0	18	7.1		20	
		03/07/04	7.0	18	7.1		20	
		03/08/04	6.9	16	7.1		20	
		03/09/04	6.9	16	7.1		20	
		03/10/04	7.0	16	7.1		20	
		03/11/04	6.9	16	7.1		20	
		03/12/04	6.8	17	7.1		20	
		03/13/04	7.4	16	7.1		20	

Noman M. Cole, Jr. Pollution Control Plant
November - March
2003-2008

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		03/14/04	7.3	16	7.1	20
		03/15/04	6.8	17	7.1	20
		03/16/04	7.0	17	7.1	20
		03/17/04	7.0	16	7.1	20
		03/18/04	6.9	16	7.1	20
		03/19/04	7.0	17	7.1	20
		03/20/04	7.1	16	7.1	20
		03/21/04	7.1	17	7.1	20
		03/22/04	6.9	16	7.1	20
		03/23/04	6.9	16	7.1	20
		03/24/04	6.8	17	7.1	20
		03/25/04	6.8	17	7.1	20
		03/26/04	7.0	18	7.1	20
		03/27/04	7.0	18	7.1	20
		03/28/04	7.0	18	7.1	20
		03/29/04	6.9	18	7.1	20
		03/30/04	6.9	18	7.1	20
		03/31/04	6.8	18	7.1	20
	11				7.0	20
		11/01/04	7.1	22	7.0	20
		11/02/04	7.1	22	7.0	20
		11/03/04	7.1	23	7.0	20
		11/04/04	7.3	23	7.0	20
		11/05/04	7.1	21	7.0	20
		11/06/04	7.1	21	7.0	20
		11/07/04	7.4	22	7.0	20
		11/08/04	7.2	22	7.0	19
		11/09/04	7.1	22	7.0	19
		11/10/04	6.9	22	7.0	19
		11/11/04	7.0	22	7.0	19
		11/12/04	7.0	22	7.0	19
		11/13/04	7.2	21	7.0	19
		11/14/04	7.2	19	7.0	19
		11/15/04	7.0	20	7.0	19
		11/16/04	7.1	20	7.0	19
		11/17/04	7.0	21	7.0	19
		11/18/04	6.9	21	7.0	19
		11/19/04	6.8	21	7.0	19
		11/20/04	7.1	21	7.0	19
		11/21/04	7.1	21	7.0	19
		11/22/04	6.9	22	7.0	19
		11/23/04	7.1	21	7.0	19
		11/24/04	7.2	21	7.0	19
		11/25/04	7.0	22	7.0	19
		11/26/04	7.3	20	7.0	19
		11/27/04	7.3	20	7.0	19
		11/28/04	7.4	21	7.0	19
		11/29/04	7.1	20	7.0	19
		11/30/04	6.8	20	7.0	19
	12				7.0	19
		12/01/04	7.0	21	7.0	19
		12/02/04	6.8	20	7.0	19
		12/03/04	6.5	18	7.0	19
		12/04/04	6.8	19	7.0	19
		12/05/04	6.8	20	7.0	19
		12/06/04	6.8	20	7.0	19
		12/07/04	6.9	20	7.0	19
		12/08/04	6.7	20	7.0	19
		12/09/04	6.8	20	7.0	19
		12/10/04	6.6	19	7.0	19
		12/11/04	6.6	18	7.0	19
		12/12/04	7.1	18	7.0	19
		12/13/04	6.7	19	7.0	19
		12/14/04	6.5	19	7.0	19
		12/15/04	6.5	18	7.0	19
		12/16/04	6.7	18	7.0	19
		12/17/04	6.8	18	7.0	19
		12/18/04	7.1	18	7.0	19
		12/19/04	6.9	19	7.0	19
		12/20/04	6.8	17	7.0	19

Noman M. Cole, Jr. Pollution Control Plant
November - March
2003-2008

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		12/21/04	6.8	17	7.0	19
		12/22/04	6.8	18	7.0	19
		12/23/04	7.2	19	7.0	19
		12/24/04	7.0	18	7.0	19
		12/25/04	7.1	17	7.0	19
		12/26/04	7.1	17	7.0	19
		12/27/04	6.8	17	7.0	19
		12/28/04	6.9	17	7.0	19
		12/29/04	6.9	18	7.0	19
		12/30/04	6.7	18	7.0	19
		12/31/04	7.0	18	7.0	19
2005					7.0	19
	1				7.0	19
		01/01/05	7.0	18	7.0	19
		01/02/05	7.2	18	7.0	19
		01/03/05	7.1	18	7.0	19
		01/04/05	7.0	18	7.0	19
		01/05/05	7.0	19	7.0	19
		01/06/05	7.1	19	7.0	19
		01/07/05	7.2	18	7.0	19
		01/08/05	7.2	17	7.0	19
		01/09/05	7.0	17	7.0	19
		01/10/05	6.9	18	7.0	18
		01/11/05	7.1	18	7.0	18
		01/12/05	7.0	18	7.0	18
		01/13/05	6.9	19	7.0	18
		01/14/05	6.9	19	7.0	18
		01/15/05	7.1	16	7.0	18
		01/16/05	7.0	16	7.0	18
		01/17/05	6.9	16	7.0	18
		01/18/05	6.9	16	7.0	18
		01/19/05	6.9	16	7.0	18
		01/20/05	6.9	17	7.0	18
		01/21/05	7.0	17	7.0	18
		01/22/05	7.1	14	7.0	18
		01/23/05	7.1	13	7.0	18
		01/24/05	6.8	16	7.0	18
		01/25/05	6.9	16	7.0	18
		01/26/05	6.8	16	7.0	18
		01/27/05	6.7	16	7.0	18
		01/28/05	6.7	16	7.0	18
		01/29/05	7.2	16	7.0	18
		01/30/05	7.2	16	7.0	18
		01/31/05	6.7	16	7.0	18
	2				7.0	18
		02/01/05	6.9	16	7.0	18
		02/02/05	6.8	16	7.0	18
		02/03/05	7.1	17	7.0	18
		02/04/05	6.9	17	7.0	18
		02/05/05	7.2	16	7.0	18
		02/06/05	7.0	16	7.0	18
		02/07/05	6.9	17	7.0	18
		02/08/05	7.0	17	7.0	18
		02/09/05	7.0	17	7.0	18
		02/10/05	6.9	17	7.0	18
		02/11/05	6.9	15	7.0	18
		02/12/05	7.2	15	7.0	18
		02/13/05	7.4	15	7.0	18
		02/14/05	7.0	15	7.0	18
		02/15/05	7.0	17	7.0	18
		02/16/05	7.0	17	7.0	18
		02/17/05	7.2	17	7.0	18
		02/18/05	7.1	16	7.0	18
		02/19/05	7.0	16	7.0	18
		02/20/05	7.1	14	7.0	18
		02/21/05	6.9	16	7.0	18
		02/22/05	6.9	17	7.0	18
		02/23/05	6.9	17	7.0	18
		02/24/05	6.8	16	7.0	18
		02/25/05	6.7	16	7.0	18

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		02/26/05	7.2	16	7.0	18
		02/27/05	7.2	16	7.0	18
		02/28/05	6.8	16	7.0	18
	3				7.0	18
		03/01/05	6.7	16	7.0	18
		03/02/05	6.7	15	7.0	18
		03/03/05	6.8	15	7.0	18
		03/04/05	6.8	16	7.0	18
		03/05/05	7.0	15	7.0	18
		03/06/05	7.0	15	7.0	18
		03/07/05	6.8	16	7.0	18
		03/08/05	6.8	16	7.0	18
		03/09/05	6.8	15	7.0	18
		03/10/05	6.8	15	7.0	18
		03/11/05	6.7	16	6.9	18
		03/12/05	7.0	15	6.9	18
		03/13/05	6.9	15	6.9	18
		03/14/05	7.0	16	6.9	18
		03/15/05	7.0	16	6.9	18
		03/16/05	6.9	16	6.9	18
		03/17/05	6.9	16	6.9	18
		03/18/05	6.8	16	6.9	18
		03/19/05	7.0	16	6.9	18
		03/20/05	7.2	16	6.9	18
		03/21/05	6.8	17	6.9	18
		03/22/05	6.8	17	6.9	18
		03/23/05	6.9	17	6.9	18
		03/24/05	6.7	16	6.9	18
		03/25/05	6.7	16	6.9	18
		03/26/05	6.9	16	6.9	18
		03/27/05	6.9	16	6.9	18
		03/28/05	6.8	17	6.9	18
		03/29/05	6.6	16	6.9	18
		03/30/05	6.6	16	6.9	18
		03/31/05	6.8	17	6.9	18
	11				6.9	18
		11/01/05	7.0	22	6.9	18
		11/02/05	7.1	21	6.9	18
		11/03/05	7.0	22	6.9	18
		11/04/05	7.1	22	6.9	18
		11/05/05	7.1	22	6.9	18
		11/06/05	7.2	22	6.9	18
		11/07/05	7.3	23	6.9	18
		11/08/05	7.1	22	6.9	18
		11/09/05	7.0	22	6.9	18
		11/10/05	7.1	22	6.9	18
		11/11/05	7.1	21	6.9	18
		11/12/05	7.2	20	6.9	18
		11/13/05	7.2	20	6.9	18
		11/14/05	7.1	23	6.9	18
		11/15/05	7.2	21	6.9	18
		11/16/05	7.2	23	6.9	18
		11/17/05	7.1	22	6.9	18
		11/18/05	7.1	21	6.9	18
		11/19/05	7.0	20	6.9	18
		11/20/05	6.6	20	6.9	18
		11/21/05	6.8	21	6.9	18
		11/22/05	6.8	20	6.9	18
		11/23/05	7.0	19	6.9	18
		11/24/05	6.9	20	6.9	18
		11/25/05	6.9	18	6.9	18
		11/26/05	7.2	17	6.9	18
		11/27/05	7.3	17	6.9	18
		11/28/05	6.8	18	6.9	18
		11/29/05	6.9	21	6.9	18
		11/30/05	6.9	21	6.9	18
	12				6.9	18
		12/01/05	6.7	22	6.9	18
		12/02/05	7.0	20	6.9	18
		12/03/05	6.9	18	6.9	18

Noman M. Cole, Jr. Pollution Control Plant
November - March
2003-2008

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		12/04/05	6.9	19	6.9	18
		12/05/05	6.6	20	6.9	18
		12/06/05	7.0	19	6.9	18
		12/07/05	6.5	19	6.9	18
		12/08/05	6.7	18	6.9	18
		12/09/05	6.8	19	6.9	18
		12/10/05	7.1	18	6.9	18
		12/11/05	6.9	18	6.9	18
		12/12/05	6.8	19	6.9	18
		12/13/05	7.0	18	6.9	18
		12/14/05	6.8	17	6.9	17
		12/15/05	6.6	18	6.9	17
		12/16/05	6.7	18	6.9	17
		12/17/05	7.2	18	6.9	17
		12/18/05	7.0	16	6.9	17
		12/19/05	7.0	18	6.9	17
		12/20/05	7.0	17	6.9	17
		12/21/05	7.2	17	6.9	17
		12/22/05	7.1	17	6.9	17
		12/23/05	7.2	17	6.9	17
		12/24/05	7.0	17	6.9	17
		12/25/05	7.0	16	6.9	17
		12/26/05	7.1	18	6.9	17
		12/27/05	7.0	17	6.9	17
		12/28/05	7.1	17	6.9	17
		12/29/05	7.1	18	6.9	17
		12/30/05	7.0	17	6.9	17
		12/31/05	6.9	17	6.9	17
2006					6.9	17
	1				6.9	17
		01/01/06	7.0	17	6.9	17
		01/02/06	7.1	17	6.9	17
		01/03/06	7.1	18	6.9	17
		01/04/06	7.0	17	6.9	17
		01/05/06	7.0	18	6.9	17
		01/06/06	7.0	18	6.9	17
		01/07/06	7.0	16	6.9	17
		01/08/06	6.9	16	6.9	17
		01/09/06	7.0	17	6.9	17
		01/10/06	7.1	17	6.9	17
		01/11/06	7.1	18	6.9	17
		01/12/06	7.0	18	6.9	17
		01/13/06	7.1	18	6.9	17
		01/14/06	7.4	16	6.9	17
		01/15/06	7.3	16	6.9	17
		01/16/06	7.0	17	6.9	17
		01/17/06	7.0	17	6.9	17
		01/18/06	7.2	18	6.9	17
		01/19/06	7.0	16	6.9	17
		01/20/06	7.0	17	6.9	17
		01/21/06	7.0	17	6.9	17
		01/22/06	7.1	17	6.9	17
		01/23/06	7.0	17	6.9	17
		01/24/06	6.9	17	6.9	17
		01/25/06	7.0	17	6.9	17
		01/26/06	7.0	16	6.9	17
		01/27/06	7.0	16	6.9	17
		01/28/06	7.1	16	6.9	17
		01/29/06	7.1	16	6.9	17
		01/30/06	7.0	17	6.9	17
		01/31/06	7.1	18	6.9	17
	2				6.9	17
		02/01/06	7.0	17	6.9	17
		02/02/06	7.1	17	6.9	17
		02/03/06	7.0	18	6.9	17
		02/04/06	7.2	17	6.9	17
		02/05/06	7.1	17	6.9	17
		02/06/06	6.9	16	6.9	17
		02/07/06	6.9	16	6.9	17
		02/08/06	6.9	16	6.9	17

Noman M. Cole, Jr. Pollution Control Plant
November - March
2003-2008

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		02/09/06	7.1	16	6.9	17
		02/10/06	7.1	16	6.9	17
		02/11/06	6.9	15	6.9	17
		02/12/06	7.0	15	6.9	17
		02/13/06	6.9	16	6.9	17
		02/14/06	7.0	16	6.9	17
		02/15/06	7.0	17	6.9	17
		02/16/06	7.0	17	6.9	17
		02/17/06	7.0	17	6.9	17
		02/18/06	7.2	16	6.9	17
		02/19/06	6.9	15	6.9	17
		02/20/06	6.9	15	6.9	17
		02/21/06	6.9	16	6.9	17
		02/22/06	7.0	16	6.9	17
		02/23/06	7.1	16	6.9	17
		02/24/06	6.9	17	6.9	17
		02/25/06	7.3	15	6.9	17
		02/26/06	7.2	16	6.9	17
		02/27/06	6.9	16	6.9	17
		02/28/06	6.8	16	6.9	17
	3				6.9	17
		03/01/06	6.8	16	6.9	17
		03/02/06	6.8	16	6.9	17
		03/03/06	6.8	16	6.9	17
		03/04/06	6.9	16	6.9	17
		03/05/06	6.9	16	6.9	17
		03/06/06	6.9	17	6.8	17
		03/07/06	6.9	16	6.8	17
		03/08/06	7.0	16	6.8	17
		03/09/06	6.8	17	6.8	17
		03/10/06	6.9	17	6.8	17
		03/11/06	7.0	18	6.8	17
		03/12/06	7.0	18	6.8	17
		03/13/06	6.9	18	6.8	17
		03/14/06	7.0	18	6.8	17
		03/15/06	7.0	17	6.8	17
		03/16/06	6.9	17	6.8	17
		03/17/06	6.9	18	6.8	17
		03/18/06	7.0	14	6.8	17
		03/19/06	7.0	15	6.8	17
		03/20/06	7.0	17	6.8	17
		03/21/06	6.9	17	6.8	17
		03/22/06	6.9	17	6.8	17
		03/23/06	6.9	17	6.8	17
		03/24/06	6.8	17	6.8	17
		03/25/06	7.0	17	6.8	17
		03/26/06	7.1	17	6.8	17
		03/27/06	6.7	17	6.8	17
		03/28/06	6.8	18	6.8	17
		03/29/06	6.7	18	6.8	17
		03/30/06	6.6	18	6.8	17
		03/31/06	6.6	18	6.8	17
	11				6.8	17
		11/01/06	7.1	22	6.8	17
		11/02/06	6.9	22	6.8	17
		11/03/06	6.8	21	6.8	17
		11/04/06	6.7	20	6.8	17
		11/05/06	7.2	20	6.8	17
		11/06/06	6.9	21	6.8	17
		11/07/06	6.9	21	6.8	17
		11/08/06	6.8	22	6.8	17
		11/09/06	6.7	21	6.8	17
		11/10/06	6.7	21	6.8	17
		11/11/06	6.8	22	6.8	17
		11/12/06	7.0	22	6.8	17
		11/13/06	6.7	20	6.8	17
		11/14/06	6.8	21	6.8	17
		11/15/06	6.9	21	6.8	17
		11/16/06	6.9	21	6.8	17
		11/17/06	6.8	20	6.8	17

Noman M. Cole, Jr. Pollution Control Plant
November - March
2003-2008

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		11/18/06	6.6	20	6.8	17
		11/19/06	6.6	21	6.8	17
		11/20/06	7.1	20	6.8	17
		11/21/06	6.8	20	6.8	17
		11/22/06	6.7	19	6.8	17
		11/23/06	6.8	20	6.8	17
		11/24/06	6.7	20	6.8	17
		11/25/06	7.0	20	6.8	17
		11/26/06	7.1	20	6.8	17
		11/27/06	6.8	20	6.8	17
		11/28/06	6.8	20	6.8	17
		11/29/06	6.8	20	6.8	17
		11/30/06	7.0	20	6.8	17
	12				6.8	17
		12/01/06	6.7	21	6.8	17
		12/02/06	6.9	20	6.8	17
		12/03/06	6.9	20	6.8	17
		12/04/06	6.8	19	6.8	17
		12/05/06	6.7	19	6.8	17
		12/06/06	6.6	19	6.8	17
		12/07/06	7.0	20	6.8	17
		12/08/06	7.2	18	6.8	17
		12/09/06	6.9	18	6.8	17
		12/10/06	6.9	18	6.8	17
		12/11/06	6.6	19	6.8	17
		12/12/06	6.7	19	6.8	16
		12/13/06	6.8	20	6.8	16
		12/14/06	6.4	19	6.8	16
		12/15/06	6.5	19	6.8	16
		12/16/06	6.8	19	6.8	16
		12/17/06	6.7	19	6.8	16
		12/18/06	6.7	19	6.8	16
		12/19/06	6.7	19	6.8	16
		12/20/06	6.7	18	6.8	16
		12/21/06	6.9	19	6.8	16
		12/22/06	6.7	20	6.8	16
		12/23/06	7.1	20	6.8	16
		12/24/06	7.2	19	6.8	16
		12/25/06	6.7	19	6.8	16
		12/26/06	6.6	18	6.8	16
		12/27/06	6.7	18	6.8	16
		12/28/06	6.7	18	6.8	16
		12/29/06	6.6	18	6.8	16
		12/30/06	6.7	18	6.8	16
		12/31/06	6.9	19	6.8	16
2007					6.8	16
	1				6.8	16
		01/01/07	6.6	18	6.8	16
		01/02/07	6.9	18	6.8	16
		01/03/07	7.0	17	6.8	16
		01/04/07	6.9	18	6.8	16
		01/05/07	7.1	19	6.8	16
		01/06/07	6.8	19	6.8	16
		01/07/07	6.8	19	6.8	16
		01/08/07	7.0	19	6.8	16
		01/09/07	7.0	17	6.8	16
		01/10/07	7.0	17	6.8	16
		01/11/07	6.8	17	6.8	16
		01/12/07	6.8	18	6.8	16
		01/13/07	7.0	18	6.8	16
		01/14/07	6.6	19	6.8	16
		01/15/07	6.8	19	6.8	16
		01/16/07	6.9	19	6.8	16
		01/17/07	6.8	17	6.8	16
		01/18/07	6.9	17	6.8	16
		01/19/07	6.8	18	6.8	16
		01/20/07	6.9	17	6.8	16
		01/21/07	7.0	17	6.8	16
		01/22/07	6.8	17	6.8	16
		01/23/07	6.8	17	6.8	16

Noman M. Cole, Jr. Pollution Control Plant
November - March
2003-2008

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		11/01/07	6.8	22	6.7	16
		11/02/07	6.9	22	6.7	16
		11/03/07	6.8	22	6.7	16
		11/04/07	7.2	22	6.7	16
		11/05/07	7.2	22	6.7	16
		~~11/06/07~~	~~7.2~~	~~22~~	~~6.7~~	~~16~~
		11/07/07	7.1	22	6.7	16
		11/08/07	6.9	21	6.7	16
		11/09/07	7.2	22	6.7	16
		11/10/07	6.8	20	6.7	16
		11/11/07	7.0	21	6.7	16
		11/12/07	7.0	18	6.7	16
		11/13/07	7.1	22	6.7	16
		11/14/07	7.1	22	6.7	16
		11/15/07	6.8	21	6.7	16
		11/16/07	6.9	20	6.7	16
		11/17/07	7.0	20	6.7	16
		11/18/07	7.1	21	6.7	16
		11/19/07	6.9	21	6.7	16
		11/20/07	6.8	21	6.7	16
		11/21/07	6.7	21	6.7	16
		11/22/07	6.9	22	6.7	16
		11/23/07	7.0	21	6.7	16
		11/24/07	7.2	20	6.7	16
		11/25/07	7.1	19	6.7	16
		11/26/07	6.8	21	6.7	16
		11/27/07	7.1	21	6.7	16
		11/28/07	6.8	21	6.7	16
		11/29/07	6.4	21	6.7	16
		11/30/07	6.7	20	6.7	16
	12				6.7	16
		12/01/07	6.9	19	6.7	16
		12/02/07	6.9	19	6.7	16
		12/03/07	7.2	20	6.7	16
		12/04/07	7.0	19	6.7	16
		12/05/07	6.8	19	6.7	16
		12/06/07	6.9	18	6.7	16
		12/07/07	6.7	19	6.7	16
		12/08/07	6.8	19	6.7	16
		12/09/07	6.7	20	6.7	16
		12/10/07	6.8	20	6.7	16
		12/11/07	6.9	20	6.7	16
		12/12/07	7.0	20	6.7	16
		12/13/07	6.8	20	6.7	16
		12/14/07	6.6	20	6.7	16
		12/15/07	6.9	18	6.7	15
		12/16/07	6.8	19	6.7	15
		12/17/07	6.9	18	6.7	15
		12/18/07	6.8	18	6.7	15
		12/19/07	6.8	18	6.7	15
		12/20/07	6.6	18	6.7	15
		12/21/07	6.6	18	6.7	15
		12/22/07	6.9	18	6.6	15
		12/23/07	6.7	18	6.6	15
		12/24/07	6.6	19	6.6	15
		12/25/07	6.8	19	6.6	15
		12/26/07	6.9	18	6.6	15
		12/27/07	6.6	18	6.6	15
		12/28/07	6.6	19	6.6	15
		12/29/07	6.8	19	6.6	15
		12/30/07	7.1	18	6.6	15
		12/31/07	6.6	18	6.6	15
2008					6.6	15
	1				6.6	15
		01/01/08	6.8	18	6.6	15
		01/02/08	6.9	18	6.6	15
		01/03/08	6.7	17	6.6	15
		01/04/08	6.5	17	6.6	15
		01/05/08	6.6	18	6.6	15
		01/06/08	6.5	18	6.6	15

Noman M. Cole, Jr. Pollution Control Plant
November - March
2003-2008

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		01/24/07	6.7	16	6.8	16
		01/25/07	6.7	16	6.8	16
		01/26/07	6.9	16	6.8	16
		01/27/07	6.9	16	6.8	16
		01/28/07	6.9	17	6.8	16
		01/29/07	7.1	16	6.8	16
		01/30/07	7.0	16	6.8	16
		01/31/07	6.9	16	6.8	16
	2				6.8	16
		02/01/07	6.9	16	6.8	16
		02/02/07	6.8	17	6.8	16
		02/03/07	6.9	16	6.8	16
		02/04/07	6.8	16	6.8	16
		02/05/07	7.0	16	6.8	16
		02/06/07	7.1	15	6.8	16
		02/07/07	6.8	16	6.8	16
		02/08/07	6.8	15	6.8	16
		02/09/07	6.9	15	6.8	16
		02/10/07	7.0	15	6.8	16
		02/11/07	6.8	15	6.8	16
		02/12/07	7.0	16	6.8	16
		02/13/07	6.8	16	6.8	16
		02/14/07	6.8	15	6.8	16
		02/15/07	6.9	15	6.8	16
		02/16/07	7.2	15	6.8	16
		02/17/07	7.0	15	6.8	16
		02/18/07	6.9	16	6.8	16
		02/19/07	6.8	15	6.8	16
		02/20/07	6.7	16	6.8	16
		02/21/07	6.9	16	6.8	16
		02/22/07	6.8	16	6.8	16
		02/23/07	6.7	15	6.8	16
		02/24/07	6.8	14	6.8	16
		02/25/07	6.9	15	6.8	16
		02/26/07	7.0	16	6.8	16
		02/27/07	7.0	15	6.7	16
		02/28/07	7.0	15	6.7	16
	3				6.7	16
		03/01/07	6.7	15	6.7	16
		03/02/07	6.9	16	6.7	16
		03/03/07	6.9	15	6.7	16
		03/04/07	6.9	15	6.7	16
		03/05/07	6.8	15	6.7	16
		03/06/07	6.8	14	6.7	16
		03/07/07	6.9	15	6.7	16
		03/08/07	6.7	15	6.7	16
		03/09/07	6.8	16	6.7	16
		03/10/07	6.8	15	6.7	16
		03/11/07	6.7	15	6.7	16
		03/12/07	7.0	16	6.7	16
		03/13/07	6.8	16	6.7	16
		03/14/07	6.7	17	6.7	16
		03/15/07	7.1	17	6.7	16
		03/16/07	6.7	16	6.7	16
		03/17/07	7.0	15	6.7	16
		03/18/07	6.9	14	6.7	16
		03/19/07	6.8	15	6.7	16
		03/20/07	6.8	16	6.7	16
		03/21/07	7.0	16	6.7	16
		03/22/07	7.0	16	6.7	16
		03/23/07	6.8	17	6.7	16
		03/24/07	6.8	17	6.7	16
		03/25/07	6.7	17	6.7	16
		03/26/07	6.9	17	6.7	16
		03/27/07	6.9	18	6.7	16
		03/28/07	6.9	18	6.7	16
		03/29/07	6.9	17	6.7	16
		03/30/07	6.8	17	6.7	16
		03/31/07	6.8	18	6.7	16
	11				6.7	16

Noman M. Cole, Jr. Pollution Control Plant
November - March
2003-2008

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		01/07/08	6.8	18	6.6	15
		01/08/08	6.8	19	6.6	15
		01/09/08	6.8	19	6.6	15
		01/10/08	6.7	18	6.6	15
		01/11/08	6.6	18	6.6	15
		01/12/08	6.2	18	6.6	15
		01/13/08	6.5	18	6.6	15
		01/14/08	6.7	19	6.6	15
		01/15/08	6.9	18	6.6	15
		01/16/08	6.7	18	6.6	15
		01/17/08	6.5	17	6.6	15
		01/18/08	6.6	18	6.6	15
		01/19/08	6.9	17	6.6	15
		01/20/08	6.7	16	6.6	15
		01/21/08	6.4	16	6.6	15
		01/22/08	6.5	17	6.6	15
		01/23/08	6.8	17	6.6	15
		01/24/08	6.6	17	6.6	15
		01/25/08	6.4	16	6.6	15
		01/26/08	6.6	14	6.6	15
		01/27/08	6.6	16	6.6	15
		01/28/08	6.6	17	6.6	15
		01/29/08	6.7	17	6.6	15
		01/30/08	6.8	17	6.6	15
		01/31/08	6.7	17	6.5	15
	2				6.5	15
		02/01/08	6.5	17	6.5	15
		02/02/08	6.8	16	6.5	15
		02/03/08	6.8	16	6.5	15
		02/04/08	6.8	17	6.5	15
		02/05/08	6.8	17	6.5	15
		02/06/08	6.8	18	6.5	15
		02/07/08	6.7	18	6.5	15
		02/08/08	6.9	17	6.5	15
		02/09/08	6.9	18	6.5	15
		02/10/08	7.1	18	6.5	15
		02/11/08	7.0	16	6.5	14
		02/12/08	6.7	16	6.5	14
		02/13/08	6.8	17	6.5	14
		02/14/08	6.7	15	6.5	14
		02/15/08	6.8	16	6.4	14
		02/16/08	6.8	16	6.4	14
		02/17/08	6.8	16	6.4	14
		02/18/08	6.5	17	6.4	14
		02/19/08	6.9	17	6.4	14
		02/20/08	6.7	17	6.4	14
		02/21/08	6.8	16	6.4	14
		02/22/08	6.5	16	6.2	13
		02/23/08	6.8	16		
		02/24/08	7.0	17		
		02/25/08	6.7	17		
		02/26/08	6.7	17		
		02/27/08	6.7	16		
		02/28/08	6.6	16		
		02/29/08	6.7	16		
	3					
		03/01/08	6.8	17		
		03/02/08	6.8	16		
		03/03/08	6.6	17		
		03/04/08	6.9	18		
		03/05/08	6.6	18		
		03/06/08	6.6	16		
		03/07/08	6.6	17		
		03/08/08	6.7	17		
		03/09/08	6.9	15		
		03/10/08	6.8	16		
		03/11/08	6.7	17		
		03/12/08	6.8	17		
		03/13/08	6.8	17		
		03/14/08	6.8	18		

Noman M. Cole, Jr. Pollution Control Plant
November - March
2003-2008

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		03/15/08	6.7	18		
		03/16/08	6.8	18		
		03/17/08	6.6	17		
		03/18/08	6.7	17		
		03/19/08	7.1	18		
		03/20/08	6.4	18		
		03/21/08	6.6	16		

Noman M. Cole, Jr. Pollution Control Plant
April - October
2003-2007

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
2003						
	4					
		04/01/03	6.3	16	8.1	28
		04/02/03	6.7	17	8.0	27
		04/03/03	6.9	18	8.0	27
		04/04/03	6.7	18	8.0	27
		04/05/03	7.2	18	8.0	27
		04/06/03	7.3	18	7.8	27
		04/07/03	7.2	18	7.7	27
		04/08/03	7.1	17	7.7	27
		04/09/03	7.1	17	7.6	27
		04/10/03	6.6	17	7.5	27
		04/11/03	7.0	17	7.5	27
		04/12/03	6.9	17	7.5	27
		04/13/03	7.1	18	7.5	27
		04/14/03	7.1	18	7.5	27
		04/15/03	6.6	18	7.5	27
		04/16/03	7.3	19	7.5	27
		04/17/03	7.2	19	7.5	27
		04/18/03	7.3	18	7.5	27
		04/19/03	7.2	18	7.5	27
		04/20/03	7.2	18	7.5	27
		04/21/03	6.9	19	7.5	27
		04/22/03	6.8	19	7.5	27
		04/23/03	7.2	19	7.5	27
		04/24/03	6.9	19	7.5	27
		04/25/03	7.2	19	7.5	26
		04/26/03	7.2	19	7.5	26
		04/27/03	7.4	20	7.5	26
		04/28/03	7.4	20	7.5	26
		04/29/03	7.2	20	7.5	26
		04/30/03	6.9	20	7.5	26
	5				7.4	26
		05/01/03	7.3	20	7.4	26
		05/02/03	7.3	21	7.4	26
		05/03/03	7.3	20	7.4	26
		05/04/03	7.4	20	7.4	26
		05/05/03	7.0	20	7.4	26
		05/06/03	7.2	19	7.4	26
		05/07/03	7.1	20	7.4	26
		05/08/03	7.3	20	7.4	26
		05/09/03	7.2	20	7.4	26
		05/10/03	7.3	18	7.4	26
		05/11/03	7.2	18	7.4	26
		05/12/03	7.2	20	7.4	26
		05/13/03	7.1	20	7.4	26
		05/14/03	7.0	19	7.4	26
		05/15/03	6.8	19	7.4	26
		05/16/03	6.9	20	7.4	26
		05/17/03	7.2	19	7.4	26
		05/18/03	7.2	19	7.4	26
		05/19/03	6.5	19	7.4	26
		05/20/03	6.9	19	7.4	26
		05/21/03	6.9	20	7.4	26
		05/22/03	6.5	19	7.4	26
		05/23/03	6.8	19	7.4	26
		05/24/03	7.2	20	7.4	26
		05/25/03	7.3	20	7.4	26
		05/26/03	7.1	20	7.4	26
		05/27/03	6.5	19	7.4	26
		05/28/03	6.3	19	7.4	26
		05/29/03	6.4	19	7.4	26
		05/30/03	6.6	19	7.4	26
		05/31/03	7.3	20	7.4	26
	6				7.4	26
		06/01/03	7.0	20	7.4	26
		06/02/03	6.5	19	7.4	26
		06/03/03	7.1	20	7.4	26
		06/04/03	7.1	20	7.4	26
		06/05/03	7.2	20	7.4	26
		06/06/03	7.2	20	7.4	26

Noman M. Cole, Jr. Pollution Control Plant
April - October
2003-2007

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH		Sorted Temperature	
		06/07/03	7.2	21	7.4		26	
		06/08/03	7.1	20	7.4		26	
		06/09/03	7.2	20	7.4		26	
		06/10/03	7.2	20	7.4		26	
		06/11/03	7.2	21	7.4		26	
		06/12/03	7.2	21	7.4		26	
		06/13/03	7.1	22	7.4		26	
		06/14/03	7.3	22	7.4		26	
		06/15/03	7.1	22	7.4		26	
		06/16/03	7.2	21	7.4		26	
		06/17/03	7.3	21	7.4		26	
		06/18/03	7.0	21	7.4		26	
		06/19/03	7.1	21	7.4		26	
		06/20/03	7.0	21	7.4		26	
		06/21/03	7.2	20	7.4		26	
		06/22/03	7.4	21	7.4		26	
		06/23/03	7.0	21	7.3		26	
		06/24/03	7.3	22	7.3		26	
		06/25/03	7.2	22	7.3		26	
		06/26/03	7.3	23	7.3		26	
		06/27/03	7.2	23	7.3		26	
		06/28/03	7.2	23	7.3		26	
		06/29/03	7.3	23	7.3		26	
		06/30/03	7.2	23	7.3		26	
	7				7.3		26	
		07/01/03	8.0	23	7.3		26	
		07/02/03	7.1	23	7.3		26	
		07/03/03	7.0	22	7.3		26	
		07/04/03	7.0	24	7.3		26	
		07/05/03	7.1	22	7.3		26	
		07/06/03	7.2	23	7.3		26	
		07/07/03	7.0	23	7.3		26	
		07/08/03	7.1	23	7.3		26	
		07/09/03	7.0	24	7.3		26	
		07/10/03	7.0	23	7.3	90th percentile	26	90th percentile
		07/11/03	7.1	23	7.3		26	
		07/12/03	7.2	22	7.3		26	
		07/13/03	7.3	23	7.3		26	
		07/14/03	7.0	24	7.3		26	
		07/15/03	7.0	24	7.3		26	
		07/16/03	7.2	24	7.3		26	
		07/17/03	7.1	24	7.3		26	
		07/18/03	7.3	24	7.3		26	
		07/19/03	7.0	23	7.3		26	
		07/20/03	7.0	24	7.3		26	
		07/21/03	7.2	24	7.3		26	
		07/22/03	7.1	25	7.3		26	
		07/23/03	7.0	24	7.3		26	
		07/24/03	6.8	24	7.3		26	
		07/25/03	6.9	24	7.3		26	
		07/26/03	7.1	24	7.3		26	
		07/27/03	7.0	24	7.3		26	
		07/28/03	6.9	24	7.3		26	
		07/29/03	7.0	24	7.3		26	
		07/30/03	7.1	24	7.3		26	
		07/31/03	7.1	24	7.3		26	
	8				7.3		26	
		08/01/03	7.0	24	7.3		26	
		08/02/03	7.2	25	7.3		26	
		08/03/03	7.2	25	7.3		26	
		08/04/03	6.9	25	7.3		26	
		08/05/03	7.0	25	7.3		26	
		08/06/03	6.9	25	7.3		26	
		08/07/03	7.0	25	7.3		26	
		08/08/03	7.1	25	7.3		26	
		08/09/03	7.4	25	7.3		26	
		08/10/03	7.4	25	7.3		26	
		08/11/03	7.1	25	7.3		26	
		08/12/03	7.2	25	7.3		26	
		08/13/03	7.0	25	7.3		26	
		08/14/03	7.0	25	7.3		26	

Noman M. Cole, Jr. Pollution Control Plant
April 2003 - October 2007

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		08/15/03	7.0	25	7.3	26
		08/16/03	7.4	26	7.3	26
		08/17/03	7.4	26	7.3	26
		08/18/03	7.3	25	7.3	26
		08/19/03	7.0	25	7.3	26
		08/20/03	7.2	25	7.3	26
		08/21/03	7.1	25	7.3	26
		08/22/03	7.1	25	7.3	26
		08/23/03	7.4	26	7.3	26
		08/24/03	7.4	26	7.3	26
		08/25/03	7.2	26	7.3	26
		08/26/03	7.3	26	7.3	26
		08/27/03	7.2	26	7.3	26
		08/28/03	7.0	26	7.3	26
		08/29/03	7.0	26	7.3	26
		08/30/03	7.3	26	7.3	26
		08/31/03	7.3	26	7.3	26
	9				7.3	26
		09/01/03	7.4	26	7.3	26
		09/02/03	6.9	26	7.3	26
		09/03/03	6.9	26	7.2	26
		09/04/03	6.6	26	7.2	26
		09/05/03	7.2	25	7.2	26
		09/06/03	7.2	25	7.2	26
		09/07/03	7.2	24	7.2	26
		09/08/03	7.1	25	7.2	26
		09/09/03	7.1	25	7.2	26
		09/10/03	7.0	25	7.2	26
		09/11/03	6.9	25	7.2	26
		09/12/03	7.1	25	7.2	26
		09/13/03	7.4	25	7.2	26
		09/14/03	7.5	25	7.2	26
		09/15/03	7.3	25	7.2	26
		09/16/03	7.2	26	7.2	26
		09/17/03	7.2	26	7.2	26
		09/18/03	7.5	25	7.2	26
		09/19/03	7.1	24	7.2	26
		09/20/03	7.1	25	7.2	26
		09/21/03	7.1	24	7.2	26
		09/22/03	6.9	25	7.2	26
		09/23/03	6.7	25	7.2	26
		09/24/03	6.9	24	7.2	26
		09/25/03	6.9	23	7.2	26
		09/26/03	6.8	24	7.2	26
		09/27/03	7.0	27	7.2	26
		09/28/03	7.3	24	7.2	26
		09/29/03	6.9	24	7.2	26
		09/30/03	6.8	24	7.2	26
	10				7.2	26
		10/01/03	6.9	23	7.2	26
		10/02/03	6.9	23	7.2	26
		10/03/03	7.0	23	7.2	26
		10/04/03	7.4	23	7.2	26
		10/05/03	7.0	23	7.2	26
		10/06/03	7.1	23	7.2	26
		10/07/03	7.0	23	7.2	26
		10/08/03	7.0	24	7.2	26
		10/09/03	6.9	24	7.2	26
		10/10/03	6.8	24	7.2	26
		10/11/03	7.0	23	7.2	26
		10/12/03	6.9	24	7.2	26
		10/13/03	7.2	24	7.2	26
		10/14/03	7.3	24	7.2	26
		10/15/03	7.0	23	7.2	26
		10/16/03	7.2	23	7.2	26
		10/17/03	7.1	23	7.2	26
		10/18/03	7.3	23	7.2	26
		10/19/03	7.3	23	7.2	26
		10/20/03	7.2	23	7.2	26
		10/21/03	7.4	23	7.2	26
		10/22/03	7.5	23	7.2	26

Noman M. Cole, Jr. Pollution Control Plant
April 2003 - October 2007

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		10/23/03	7.3	22	7.2	26
		10/24/03	7.3	22	7.2	26
		10/25/03	7.4	22	7.2	26
		10/26/03	7.3	22	7.2	26
		10/27/03	7.6	23	7.2	26
		10/28/03	7.3	22	7.2	26
		10/29/03	6.8	21	7.2	26
		10/30/03	6.9	21	7.2	26
		10/31/03	7.3	21	7.2	26
2004	4				7.2	26
		04/01/04	7.0	18	7.2	26
		04/02/04	6.8	17	7.2	26
		04/03/04	6.9	17	7.2	25
		04/04/04	6.9	16	7.2	25
		04/05/04	6.7	16	7.2	25
		04/06/04	7.1	16	7.2	25
		04/07/04	6.8	17	7.2	25
		04/08/04	6.7	17	7.2	25
		04/09/04	7.1	17	7.2	25
		04/10/04	7.0	17	7.2	25
		04/11/04	7.2	16	7.2	25
		04/12/04	6.9	18	7.2	25
		04/13/04	6.6	17	7.2	25
		04/14/04	7.0	17	7.2	25
		04/15/04	6.6	16	7.2	25
		04/16/04	6.9	17	7.2	25
		04/17/04	6.8	17	7.2	25
		04/18/04	6.9	21	7.2	25
		04/19/04	6.7	18	7.2	25
		04/20/04	6.8	18	7.2	25
		04/21/04	6.9	18	7.2	25
		04/22/04	6.7	18	7.2	25
		04/23/04	6.8	19	7.2	25
		04/24/04	7.2	20	7.2	25
		04/25/04	7.0	19	7.2	25
		04/26/04	6.7	19	7.2	25
		04/27/04	6.9	19	7.2	25
		04/28/04	6.7	18	7.2	25
		04/29/04	6.6	19	7.2	25
		04/30/04	6.6	19	7.2	25
	5				7.2	25
		05/01/04	7.0	20	7.2	25
		05/02/04	7.2	20	7.2	25
		05/03/04	6.6	19	7.2	25
		05/04/04	6.7	19	7.2	25
		05/05/04	6.8	19	7.2	25
		05/06/04	6.8	20	7.2	25
		05/07/04	6.8	20	7.2	25
		05/08/04	7.1	19	7.2	25
		05/09/04	7.0	20	7.2	25
		05/10/04	6.8	21	7.2	25
		05/11/04	6.8	21	7.2	25
		05/12/04	6.7	21	7.2	25
		05/13/04	6.7	21	7.2	25
		05/14/04	6.8	21	7.2	25
		05/15/04	7.0	22	7.2	25
		05/16/04	7.1	22	7.2	25
		05/17/04	6.8	22	7.2	25
		05/18/04	6.8	22	7.2	25
		05/19/04	6.8	22	7.2	25
		05/20/04	6.8	22	7.2	25
		05/21/04	6.8	22	7.2	25
		05/22/04	7.5	23	7.2	25
		05/23/04	7.4	22	7.2	25
		05/24/04	7.0	22	7.2	25
		05/25/04	7.0	22	7.2	25
		05/26/04	7.0	22	7.2	25
		05/27/04	7.0	22	7.2	25
		05/28/04	6.9	23	7.2	25
		05/29/04	7.2	21	7.2	25
		05/30/04	7.0	21	7.2	25

Noman M. Cole, Jr. Pollution Control Plant
April 2003 - October 2007

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		05/31/04	7.1	22	7.2	25
	6				7.2	25
		06/01/04	7.0	23	7.2	25
		06/02/04	7.1	23	7.2	25
		06/03/04	7.1	23	7.2	25
		06/04/04	7.0	22	7.2	25
		~~06/05/04~~	~~7.0~~	~~21~~	~~7.2~~	25
		06/06/04	6.9	21	7.2	25
		06/07/04	6.9	22	7.2	25
		06/08/04	7.0	23	7.2	25
		06/09/04	6.9	23	7.2	25
		06/10/04	6.8	23	7.2	25
		06/11/04	6.8	23	7.2	25
		06/12/04	7.0	22	7.1	25
		06/13/04	7.1	22	7.1	25
		06/14/04	6.8	23	7.1	25
		06/15/04	6.9	23	7.1	25
		06/16/04	6.9	23	7.1	25
		06/17/04	6.9	24	7.1	25
		06/18/04	6.9	24	7.1	25
		06/19/04	6.9	24	7.1	25
		06/20/04	7.0	23	7.1	25
		06/21/04	6.9	23	7.1	25
		06/22/04	6.8	24	7.1	25
		06/23/04	6.8	24	7.1	25
		06/24/04	6.7	23	7.1	25
		06/25/04	6.7	24	7.1	25
		06/26/04	7.1	24	7.1	25
		06/27/04	7.1	23	7.1	25
		06/28/04	7.0	24	7.1	25
		06/29/04	6.9	24	7.1	25
		06/30/04	6.9	24	7.1	25
	7				7.1	25
		07/01/04	6.9	24	7.1	25
		07/02/04	6.8	24	7.1	25
		07/03/04	7.0	25	7.1	25
		07/04/04	7.0	25	7.1	25
		07/05/04	6.9	25	7.1	25
		07/06/04	6.9	25	7.1	25
		07/07/04	7.1	25	7.1	25
		07/08/04	6.9	25	7.1	25
		07/09/04	6.9	25	7.1	25
		07/10/04	7.2	25	7.1	25
		07/11/04	7.1	25	7.1	25
		07/12/04	6.9	25	7.1	25
		07/13/04	6.9	25	7.1	25
		07/14/04	7.0	25	7.1	25
		07/15/04	7.0	25	7.1	25
		07/16/04	7.0	25	7.1	25
		07/17/04	7.0	25	7.1	25
		07/18/04	7.1	25	7.1	25
		07/19/04	6.9	25	7.1	25
		07/20/04	7.0	25	7.1	25
		07/21/04	7.3	25	7.1	25
		07/22/04	7.0	25	7.1	25
		07/23/04	7.0	25	7.1	25
		07/24/04	7.3	25	7.1	25
		07/25/04	7.3	25	7.1	25
		07/26/04	7.2	25	7.1	25
		07/27/04	7.1	25	7.1	25
		07/28/04	7.0	25	7.1	25
		07/29/04	7.0	25	7.1	25
		07/30/04	7.1	25	7.1	25
		07/31/04	6.9	26	7.1	25
	8				7.1	25
		08/01/04	6.9	26	7.1	25
		08/02/04	7.1	26	7.1	25
		08/03/04	7.3	25	7.1	25
		08/04/04	7.2	25	7.1	25
		08/05/04	7.3	25	7.1	25
		08/06/04	7.3	24	7.1	25

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		08/07/04	7.4	24	7.1	25
		08/08/04	7.0	23	7.1	25
		08/09/04	7.1	25	7.1	25
		08/10/04	7.2	25	7.1	25
		08/11/04	7.2	26	7.1	25
		08/12/04	7.3	25	7.1	25
		08/13/04	7.1	25	7.1	25
		08/14/04	7.5	24	7.1	25
		08/15/04	7.5	24	7.1	25
		08/16/04	7.3	25	7.1	25
		08/17/04	7.2	25	7.1	25
		08/18/04	7.2	25	7.1	25
		08/19/04	7.1	25	7.1	25
		08/20/04	7.2	26	7.1	25
		08/21/04	7.1	26	7.1	25
		08/22/04	6.7	25	7.1	25
		08/23/04	7.4	25	7.1	25
		08/24/04	7.2	25	7.1	25
		08/25/04	7.3	26	7.1	25
		08/26/04	7.2	25	7.1	25
		08/27/04	7.4	26	7.1	25
		08/28/04	7.1	24	7.1	25
		08/29/04	7.0	26	7.1	25
		08/30/04	7.3	26	7.1	25
		08/31/04	7.4	26	7.1	25
	9				7.1	25
		09/01/04	7.4	25	7.1	25
		09/02/04	7.4	26	7.1	25
		09/03/04	7.4	26	7.1	25
		09/04/04	7.5	25	7.1	25
		09/05/04	7.4	25	7.1	25
		09/06/04	7.3	25	7.1	25
		09/07/04	7.3	25	7.1	25
		09/08/04	7.4	26	7.1	25
		09/09/04	7.4	26	7.1	25
		09/10/04	7.3	25	7.1	25
		09/11/04	7.1	25	7.1	25
		09/12/04	7.2	25	7.1	25
		09/13/04	7.1	26	7.1	25
		09/14/04	7.5	26	7.1	25
		09/15/04	7.1	25	7.1	25
		09/16/04	7.2	25	7.1	25
		09/17/04	7.0	26	7.1	25
		09/18/04	7.5	26	7.1	25
		09/19/04	7.3	24	7.1	25
		09/20/04	8.0	24	7.1	25
		09/21/04	7.0	24	7.1	25
		09/22/04	7.0	25	7.1	25
		09/23/04	7.1	24	7.1	25
		09/24/04	7.2	25	7.1	25
		09/25/04	7.2	24	7.1	25
		09/26/04	7.4	25	7.1	25
		09/27/04	7.3	25	7.1	25
		09/28/04	7.2	26	7.1	25
		09/29/04	7.0	25	7.1	25
		09/30/04	7.0	25	7.1	25
	10				7.1	24
		10/01/04	7.2	24	7.1	24
		10/02/04	7.5	24	7.1	24
		10/03/04	7.4	24	7.1	24
		10/04/04	7.1	24	7.1	24
		10/05/04	7.0	24	7.1	24
		10/06/04	7.0	24	7.1	24
		10/07/04	7.1	24	7.1	24
		10/08/04	7.0	24	7.1	24
		10/09/04	7.2	23	7.1	24
		10/10/04	7.1	23	7.1	24
		10/11/04	7.0	24	7.1	24
		10/12/04	7.1	23	7.1	24
		10/13/04	7.0	23	7.1	24
		10/14/04	6.9	23	7.1	24

Noman M. Cole, Jr. Pollution Control Plant
April 2003 - October 2007

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		10/15/04	7.0	24	7.1	24
		10/16/04	7.1	23	7.1	24
		10/17/04	7.2	23	7.1	24
		10/18/04	7.0	23	7.1	24
		10/19/04	7.1	23	7.1	24
		10/20/04	7.1	23	7.1	24
		10/21/04	6.9	24	7.1	24
		10/22/04	6.9	23	7.1	24
		10/23/04	7.1	22	7.1	24
		10/24/04	7.2	22	7.1	24
		10/25/04	7.0	23	7.1	24
		10/26/04	7.0	23	7.1	24
		10/27/04	7.0	21	7.1	24
		10/28/04	7.0	23	7.1	24
		10/29/04	7.1	23	7.1	24
		10/30/04	7.3	22	7.1	24
		10/31/04	7.3	23	7.1	24
2005	4				7.1	24
		04/01/05	6.8	17	7.1	24
		04/02/05	6.9	17	7.1	24
		04/03/05	6.8	16	7.1	24
		04/04/05	6.7	15	7.1	24
		04/05/05	6.8	16	7.1	24
		04/06/05	6.6	16	7.1	24
		04/07/05	6.6	17	7.1	24
		04/08/05	6.8	18	7.1	24
		04/09/05	7.0	17	7.1	24
		04/10/05	7.0	17	7.1	24
		04/11/05	6.8	18	7.1	24
		04/12/05	6.7	18	7.1	24
		04/13/05	6.9	18	7.1	24
		04/14/05	6.7	18	7.1	24
		04/15/05	6.9	18	7.1	24
		04/16/05	7.2	18	7.1	24
		04/17/05	7.2	17	7.1	24
		04/18/05	6.7	18	7.1	24
		04/19/05	6.7	19	7.1	24
		04/20/05	6.6	19	7.1	24
		04/21/05	7.0	20	7.1	24
		04/22/05	7.0	19	7.1	24
		04/23/05	7.2	19	7.1	24
		04/24/05	6.8	19	7.1	24
		04/25/05	6.8	18	7.1	24
		04/26/05	6.8	18	7.1	24
		04/27/05	6.7	19	7.1	24
		04/28/05	6.8	19	7.1	24
		04/29/05	6.8	19	7.1	24
		04/30/05	6.7	19	7.0	24
	5				7.0	24
		05/01/05	7.0	19	7.0	24
		05/02/05	6.8	19	7.0	24
		05/03/05	7.1	19	7.0	24
		05/04/05	7.0	19	7.0	24
		05/05/05	7.0	19	7.0	24
		05/06/05	7.0	19	7.0	24
		05/07/05	7.0	17	7.0	24
		05/08/05	6.9	20	7.0	24
		05/09/05	6.9	20	7.0	24
		05/10/05	6.8	20	7.0	24
		05/11/05	7.0	20	7.0	24
		05/12/05	7.0	21	7.0	24
		05/13/05	7.0	20	7.0	24
		05/14/05	7.4	20	7.0	24
		05/15/05	7.2	21	7.0	24
		05/16/05	6.9	21	7.0	24
		05/17/05	6.9	21	7.0	24
		05/18/05	7.0	21	7.0	24
		05/19/05	6.9	21	7.0	24
		05/20/05	6.8	20	7.0	24
		05/21/05	7.2	19	7.0	24
		05/22/05	6.8	19	7.0	24

Noman M. Cole, Jr. Pollution Control Plant
April 2003 - October 2007

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		05/23/05	7.0	20	7.0	24
		05/24/05	7.0	20	7.0	24
		05/25/05	6.8	20	7.0	24
		05/26/05	6.9	19	7.0	24
		05/27/05	6.8	20	7.0	24
		05/28/05	7.2	21	7.0	24
		05/29/05	7.3	20	7.0	24
		05/30/05	6.9	21	7.0	24
		05/31/05	6.8	21	7.0	24
	6				7.0	24
		06/01/05	7.0	21	7.0	24
		06/02/05	6.9	21	7.0	24
		06/03/05	6.9	21	7.0	24
		06/04/05	6.8	21	7.0	24
		06/05/05	6.8	22	7.0	24
		06/06/05	6.8	22	7.0	24
		06/07/05	6.8	22	7.0	24
		06/08/05	6.8	22	7.0	24
		06/09/05	7.0	22	7.0	24
		06/10/05	7.0	23	7.0	24
		06/11/05	7.4	25	7.0	24
		06/12/05	7.4	24	7.0	24
		06/13/05	6.9	23	7.0	24
		06/14/05	6.9	23	7.0	24
		06/15/05	6.9	24	7.0	24
		06/16/05	6.9	23	7.0	24
		06/17/05	7.0	23	7.0	24
		06/18/05	7.5	23	7.0	24
		06/19/05	7.5	23	7.0	24
		06/20/05	7.1	23	7.0	24
		06/21/05	7.0	23	7.0	24
		06/22/05	7.1	24	7.0	24
		06/23/05	7.0	23	7.0	24
		06/24/05	6.8	24	7.0	24
		06/25/05	7.0	24	7.0	24
		06/26/05	6.7	26	7.0	24
		06/27/05	6.8	24	7.0	24
		06/28/05	7.0	24	7.0	24
		06/29/05	7.0	24	7.0	24
		06/30/05	6.9	24	7.0	24
	7				7.0	24
		07/01/05	7.1	24	7.0	24
		07/02/05	7.1	25	7.0	24
		07/03/05	7.2	25	7.0	24
		07/04/05	7.0	24	7.0	24
		07/05/05	7.0	24	7.0	24
		07/06/05	7.0	24	7.0	24
		07/07/05	7.0	24	7.0	24
		07/08/05	6.9	24	7.0	24
		07/09/05	7.1	24	7.0	24
		07/10/05	7.2	25	7.0	24
		07/11/05	6.8	24	7.0	24
		07/12/05	6.8	24	7.0	24
		07/13/05	6.9	25	7.0	24
		07/14/05	6.9	25	7.0	24
		07/15/05	6.9	25	7.0	24
		07/16/05	7.3	25	7.0	24
		07/17/05	7.2	25	7.0	24
		07/18/05	6.9	25	7.0	24
		07/19/05	7.0	25	7.0	24
		07/20/05	6.9	25	7.0	24
		07/21/05	6.8	25	7.0	24
		07/22/05	6.8	26	7.0	23
		07/23/05	7.0	26	7.0	23
		07/24/05	7.0	26	7.0	23
		07/25/05	6.9	26	7.0	23
		07/26/05	6.9	26	7.0	23
		07/27/05	7.0	26	7.0	23
		07/28/05	6.9	26	7.0	23
		07/29/05	6.8	25	7.0	23
		07/30/05	7.0	26	7.0	23

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		07/31/05	7.0	25	7.0	23
	8				7.0	23
		08/01/05	6.9	25	7.0	23
		08/02/05	7.0	26	7.0	23
		08/03/05	7.0	26	7.0	23
		08/04/05	7.0	26	7.0	23
		08/05/05	7.0	26	7.0	23
		08/06/05	7.2	26	7.0	23
		08/07/05	7.0	27	7.0	23
		08/08/05	7.0	26	7.0	23
		08/09/05	7.0	26	7.0	23
		08/10/05	7.0	26	7.0	23
		08/11/05	6.8	26	7.0	23
		08/12/05	6.8	26	7.0	23
		08/13/05	8.1	27	7.0	23
		08/14/05	8.0	27	7.0	23
		08/15/05	6.7	27	7.0	23
		08/16/05	7.0	27	7.0	23
		08/17/05	6.9	26	7.0	23
		08/18/05	6.9	26	7.0	23
		08/19/05	7.0	26	7.0	23
		08/20/05	7.0	26	7.0	23
		08/21/05	7.2	26	7.0	23
		08/22/05	6.9	26	7.0	23
		08/23/05	7.0	26	7.0	23
		08/24/05	7.1	26	7.0	23
		08/25/05	6.9	26	7.0	23
		08/26/05	7.0	26	7.0	23
		08/27/05	7.1	26	7.0	23
		08/28/05	7.1	26	7.0	23
		08/29/05	7.0	26	7.0	23
		08/30/05	6.9	27	7.0	23
		08/31/05	7.0	26	7.0	23
	9				7.0	23
		09/01/05	6.9	26	7.0	23
		09/02/05	7.0	26	7.0	23
		09/03/05	7.4	26	7.0	23
		09/04/05	7.0	26	7.0	23
		09/05/05	7.0	26	7.0	23
		09/06/05	7.0	26	7.0	23
		09/07/05	6.9	26	7.0	23
		09/08/05	6.9	26	7.0	23
		09/09/05	7.1	26	7.0	23
		09/10/05	7.1	26	7.0	23
		09/11/05	7.1	26	7.0	23
		09/12/05	7.2	26	7.0	23
		09/13/05	7.4	26	7.0	23
		09/14/05	7.4	26	7.0	23
		09/15/05	7.4	26	7.0	23
		09/16/05	7.2	26	7.0	23
		09/17/05	7.7	26	7.0	23
		09/18/05	7.3	26	7.0	23
		09/19/05	7.3	26	7.0	23
		09/20/05	7.4	26	7.0	23
		09/21/05	7.5	26	7.0	23
		09/22/05	7.5	26	7.0	23
		09/23/05	7.4	26	7.0	23
		09/24/05	7.4	26	7.0	23
		09/25/05	7.4	26	7.0	23
		09/26/05	7.4	26	7.0	23
		09/27/05	7.4	26	7.0	23
		09/28/05	7.2	27	7.0	23
		09/29/05	7.3	26	7.0	23
		09/30/05	7.4	25	7.0	23
	10				7.0	23
		10/01/05	7.7	25	7.0	23
		10/02/05	7.8	26	7.0	23
		10/03/05	7.4	26	7.0	23
		10/04/05	7.5	26	7.0	23
		10/05/05	7.5	27	7.0	23
		10/06/05	7.5	27	7.0	23

Noman M. Cole, Jr. Pollution Control Plant
April 2003 - October 2007

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		10/07/05	7.5	27	7.0	23
		10/08/05	7.2	26	7.0	23
		10/09/05	7.0	24	7.0	23
		10/10/05	7.1	25	7.0	23
		10/11/05	7.2	25	7.0	23
		10/12/05	7.1	25	7.0	23
		10/13/05	7.1	25	7.0	23
		10/14/05	7.0	25	7.0	23
		10/15/05	7.1	24	7.0	23
		10/16/05	7.0	24	7.0	23
		10/17/05	7.1	24	7.0	23
		10/18/05	7.1	25	7.0	23
		10/19/05	7.1	25	7.0	23
		10/20/05	7.0	25	7.0	23
		10/21/05	6.6	25	7.0	23
		10/22/05	6.8	22	7.0	23
		10/23/05	6.9	21	7.0	23
		10/24/05	7.1	23	7.0	23
		10/25/05	7.0	23	7.0	23
		10/26/05	7.0	22	7.0	23
		10/27/05	6.7	22	7.0	23
		10/28/05	6.8	22	7.0	23
		10/29/05	7.1	20	7.0	23
		10/30/05	7.1	20	7.0	23
		10/31/05	7.0	22	7.0	23
2006	4				7.0	23
		04/01/06	6.9	20	7.0	23
		04/02/06	6.9	19	7.0	23
		04/03/06	6.7	19	7.0	23
		04/04/06	7.0	18	7.0	23
		04/05/06	6.8	18	7.0	23
		04/06/06	6.8	18	7.0	23
		04/07/06	6.7	18	7.0	23
		04/08/06	7.0	20	7.0	23
		04/09/06	6.7	18	7.0	23
		04/10/06	6.7	18	7.0	23
		04/11/06	6.9	19	7.0	23
		04/12/06	6.6	19	7.0	23
		04/13/06	6.8	19	7.0	23
		04/14/06	6.8	19	7.0	23
		04/15/06	7.3	20	7.0	23
		04/16/06	7.3	21	7.0	23
		04/17/06	6.9	20	7.0	23
		04/18/06	6.8	19	7.0	22
		04/19/06	6.8	19	7.0	22
		04/20/06	6.8	19	7.0	22
		04/21/06	6.7	20	7.0	22
		04/22/06	7.0	20	7.0	22
		04/23/06	6.9	20	7.0	22
		04/24/06	6.9	20	7.0	22
		04/25/06	6.8	19	7.0	22
		04/26/06	6.9	19	7.0	22
		04/27/06	6.9	20	7.0	22
		04/28/06	6.9	19	7.0	22
		04/29/06	7.1	20	7.0	22
		04/30/06	6.9	19	7.0	22
	5				7.0	22
		05/01/06	6.8	20	7.0	22
		05/02/06	7.0	20	7.0	22
		05/03/06	6.8	20	7.0	22
		05/04/06	6.7	20	7.0	22
		05/05/06	6.8	21	7.0	22
		05/06/06	7.0	22	7.0	22
		05/07/06	7.0	21	7.0	22
		05/08/06	6.6	21	7.0	22
		05/09/06	6.7	20	7.0	22
		05/10/06	6.9	21	7.0	22
		05/11/06	6.7	21	7.0	22
		05/12/06	7.0	21	7.0	22
		05/13/06	6.9	21	6.9	22
		05/14/06	6.9	21	6.9	22

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		05/15/06	6.9	21	6.9	22
		05/16/06	7.0	21	6.9	22
		05/17/06	7.0	20	6.9	22
		05/18/06	6.9	20	6.9	22
		05/19/06	6.6	20	6.9	22
		05/20/06	7.0	20	6.9	22
		05/21/06	6.9	21	6.9	22
		05/22/06	6.8	20	6.9	22
		05/23/06	6.9	20	6.9	22
		05/24/06	6.8	21	6.9	22
		05/25/06	6.9	21	6.9	22
		05/26/06	6.8	22	6.9	22
		05/27/06	6.8	22	6.9	22
		05/28/06	8.0	23	6.9	22
		05/29/06	6.7	22	6.9	22
		05/30/06	6.9	22	6.9	22
		05/31/06	7.0	23	6.9	22
	6				6.9	22
		06/01/06	6.7	22	6.9	22
		06/02/06	6.7	23	6.9	22
		06/03/06	6.9	23	6.9	22
		06/04/06	7.2	23	6.9	22
		06/05/06	6.8	23	6.9	22
		06/06/06	7.0	23	6.9	22
		06/07/06	6.8	23	6.9	22
		06/08/06	6.9	23	6.9	22
		06/09/06	6.9	23	6.9	22
		06/10/06	7.0	23	6.9	22
		06/11/06	7.1	23	6.9	22
		06/12/06	6.9	23	6.9	22
		06/13/06	6.9	23	6.9	22
		06/14/06	6.8	23	6.9	22
		06/15/06	6.6	23	6.9	22
		06/16/06	6.7	23	6.9	22
		06/17/06	6.9	24	6.9	22
		06/18/06	6.9	25	6.9	22
		06/19/06	7.0	24	6.9	22
		06/20/06	6.9	24	6.9	22
		06/21/06	6.8	24	6.9	22
		06/22/06	6.8	24	6.9	22
		06/23/06	6.8	24	6.9	22
		06/24/06	7.1	26	6.9	22
		06/25/06	7.1	26	6.9	22
		06/26/06	6.8	25	6.9	22
		06/27/06	6.7	23	6.9	21
		06/28/06	6.6	22	6.9	21
		06/29/06	6.7	23	6.9	21
		06/30/06	6.7	23	6.9	21
	7				6.9	21
		07/01/06	6.7	24	6.9	21
		07/02/06	6.8	26	6.9	21
		07/03/06	6.7	24	6.9	21
		07/04/06	6.8	24	6.9	21
		07/05/06	6.7	24	6.9	21
		07/06/06	6.5	23	6.9	21
		07/07/06	6.6	23	6.9	21
		07/08/06	6.8	24	6.9	21
		07/09/06	6.6	24	6.9	21
		07/10/06	7.1	24	6.9	21
		07/11/06	6.5	24	6.9	21
		07/12/06	6.8	25	6.9	21
		07/13/06	6.5	24	6.9	21
		07/14/06	6.5	25	6.9	21
		07/15/06	6.8	26	6.9	21
		07/16/06	6.8	26	6.9	21
		07/17/06	6.7	25	6.9	21
		07/18/06	6.6	26	6.9	21
		07/19/06	6.5	26	6.9	21
		07/20/06	6.5	25	6.9	21
		07/21/06	7.0	26	6.9	21
		07/22/06	7.2	26	6.9	21

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		07/23/06	7.3	26	6.9	21
		07/24/06	7.1	25	6.9	21
		07/25/06	7.1	25	6.9	21
		07/26/06	7.0	25	6.9	21
		07/27/06	7.0	25	6.9	21
		07/28/06	7.1	25	6.9	21
		07/29/06	7.0	27	6.9	21
		07/30/06	7.0	27	6.9	21
		07/31/06	7.0	26	6.9	21
	8				6.9	21
		08/01/06	7.1	26	6.9	21
		08/02/06	7.1	26	6.9	21
		08/03/06	7.0	26	6.9	21
		08/04/06	7.1	26	6.9	21
		08/05/06	7.4	27	6.9	21
		08/06/06	7.1	28	6.9	21
		08/07/06	7.1	26	6.9	21
		08/08/06	7.0	26	6.9	21
		08/09/06	7.1	26	6.9	21
		08/10/06	6.9	26	6.9	21
		08/11/06	7.2	26	6.9	21
		08/12/06	7.2	25	6.9	21
		08/13/06	7.1	24	6.9	21
		08/14/06	7.1	26	6.9	21
		08/15/06	7.1	26	6.9	21
		08/16/06	7.1	26	6.9	21
		08/17/06	6.8	26	6.9	21
		08/18/06	7.1	26	6.9	21
		08/19/06	7.2	26	6.9	21
		08/20/06	7.1	27	6.9	21
		08/21/06	7.2	26	6.9	21
		08/22/06	7.1	26	6.9	21
		08/23/06	7.2	26	6.9	21
		08/24/06	7.1	26	6.9	21
		08/25/06	7.2	26	6.9	21
		08/26/06	7.0	27	6.9	21
		08/27/06	7.1	27	6.9	21
		08/28/06	7.3	27	6.9	21
		08/29/06	7.4	27	6.9	21
		08/30/06	7.3	27	6.9	21
		08/31/06	7.0	26	6.9	21
	9				6.9	21
		09/01/06	7.1	26	6.9	21
		09/02/06	7.2	23	6.9	20
		09/03/06	7.0	23	6.9	20
		09/04/06	7.1	26	6.9	20
		09/05/06	7.1	26	6.9	20
		09/06/06	7.1	25	6.9	20
		09/07/06	7.1	25	6.9	20
		09/08/06	7.1	25	6.9	20
		09/09/06	7.0	26	6.9	20
		09/10/06	7.0	26	6.9	20
		09/11/06	7.0	26	6.9	20
		09/12/06	7.0	25	6.9	20
		09/13/06	7.0	25	6.9	20
		09/14/06	6.9	25	6.9	20
		09/15/06	6.7	25	6.9	20
		09/16/06	7.1	25	6.9	20
		09/17/06	7.0	25	6.9	20
		09/18/06	7.0	26	6.9	20
		09/19/06	7.1	26	6.9	20
		09/20/06	7.2	25	6.9	20
		09/21/06	7.1	24	6.9	20
		09/22/06	7.1	24	6.9	20
		09/23/06	7.0	24	6.9	20
		09/24/06	7.1	23	6.9	20
		09/25/06	7.1	25	6.9	20
		09/26/06	7.1	25	6.9	20
		09/27/06	7.2	25	6.9	20
		09/28/06	7.0	25	6.9	20
		09/29/06	6.7	24	6.9	20

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		09/30/06	7.2	22	6.9	20
	10				6.9	20
		10/01/06	7.5	23	6.9	20
		10/02/06	7.2	24	6.9	20
		10/03/06	7.2	24	6.9	20
		10/04/06	7.2	25	6.9	20
		10/05/06	7.2	25	6.9	20
		10/06/06	7.1	24	6.8	20
		10/07/06	7.0	22	6.8	20
		10/08/06	7.0	23	6.8	20
		10/09/06	7.1	25	6.8	20
		10/10/06	7.0	24	6.8	20
		10/11/06	7.0	24	6.8	20
		10/12/06	7.1	24	6.8	20
		10/13/06	7.0	23	6.8	20
		10/14/06	7.0	21	6.8	20
		10/15/06	7.4	22	6.8	20
		10/16/06	7.0	22	6.8	20
		10/17/06	7.0	23	6.8	20
		10/18/06	6.9	23	6.8	20
		10/19/06	6.9	24	6.8	20
		10/20/06	7.0	24	6.8	20
		10/21/06	6.6	21	6.8	20
		10/22/06	6.9	22	6.8	20
		10/23/06	7.0	22	6.8	20
		10/24/06	7.0	22	6.8	20
		10/25/06	7.0	21	6.8	20
		10/26/06	6.9	21	6.8	20
		10/27/06	7.0	22	6.8	20
		10/28/06	7.1	20	6.8	20
		10/29/06	7.2	20	6.8	20
		10/30/06	6.7	21	6.8	20
		10/31/06	6.8	22	6.8	20
2007	4				6.8	20
		04/01/07	6.9	18	6.8	20
		04/02/07	6.8	18	6.8	20
		04/03/07	6.9	18	6.8	20
		04/04/07	6.9	18	6.8	20
		04/05/07	6.8	17	6.8	20
		04/06/07	6.9	17	6.8	20
		04/07/07	6.6	17	6.8	20
		04/08/07	6.9	17	6.8	20
		04/09/07	6.8	17	6.8	20
		04/10/07	6.9	17	6.8	20
		04/11/07	6.8	17	6.8	20
		04/12/07	6.8	18	6.8	20
		04/13/07	6.8	17	6.8	20
		04/14/07	6.8	18	6.8	20
		04/15/07	6.6	18	6.8	20
		04/16/07	6.8	16	6.8	20
		04/17/07	6.8	16	6.8	20
		04/18/07	6.8	16	6.8	20
		04/19/07	6.7	17	6.8	20
		04/20/07	6.6	18	6.8	19
		04/21/07	6.8	18	6.8	19
		04/22/07	6.9	18	6.8	19
		04/23/07	7.0	18	6.8	19
		04/24/07	6.6	19	6.8	19
		04/25/07	6.7	19	6.8	19
		04/26/07	7.0	19	6.8	19
		04/27/07	6.8	19	6.8	19
		04/28/07	6.9	19	6.8	19
		04/29/07	6.7	19	6.8	19
		04/30/07	6.7	19	6.8	19
	5				6.8	19
		05/01/07	7.1	20	6.8	19
		05/02/07	6.7	20	6.8	19
		05/03/07	6.7	20	6.8	19
		05/04/07	6.8	20	6.8	19
		05/05/07	7.0	20	6.8	19
		05/06/07	7.0	19	6.8	19

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		05/07/07	7.3	19	6.8	19
		05/08/07	7.0	19	6.8	19
		05/09/07	6.9	20	6.8	19
		05/10/07	6.8	21	6.8	19
		05/11/07	6.7	21	6.8	19
		05/12/07	6.8	21	6.8	19
		05/13/07	6.9	20	6.8	19
		05/14/07	7.0	20	6.8	19
		05/15/07	7.2	20	6.8	19
		05/16/07	7.0	21	6.8	19
		05/17/07	7.1	21	6.8	19
		05/18/07	6.9	21	6.8	19
		05/19/07	6.9	18	6.8	19
		05/20/07	6.9	18	6.8	19
		05/21/07	7.0	21	6.8	19
		05/22/07	6.8	21	6.8	19
		05/23/07	6.8	21	6.8	19
		05/24/07	7.2	21	6.8	19
		05/25/07	6.9	21	6.8	19
		05/26/07	6.8	22	6.8	19
		05/27/07	7.1	22	6.8	19
		05/28/07	6.9	22	6.8	19
		05/29/07	7.0	22	6.8	19
		05/30/07	7.1	22	6.8	19
		05/31/07	6.7	22	6.8	19
	6				6.8	19
		06/01/07	6.8	22	6.8	19
		06/02/07	6.9	23	6.8	19
		06/03/07	7.0	23	6.8	19
		06/04/07	6.9	23	6.8	19
		06/05/07	6.9	23	6.8	19
		06/06/07	7.0	22	6.8	19
		06/07/07	7.1	22	6.8	19
		06/08/07	6.8	23	6.8	19
		06/09/07	7.2	24	6.8	19
		06/10/07	6.8	23	6.8	19
		06/11/07	7.1	23	6.8	19
		06/12/07	7.0	23	6.8	19
		06/13/07	7.0	23	6.8	19
		06/14/07	6.8	23	6.8	19
		06/15/07	6.7	22	6.8	19
		06/16/07	6.9	22	6.8	19
		06/17/07	6.8	24	6.8	19
		06/18/07	7.1	24	6.8	19
		06/19/07	7.1	23	6.8	19
		06/20/07	7.1	24	6.8	19
		06/21/07	7.1	24	6.8	19
		06/22/07	7.1	23	6.8	19
		06/23/07	7.4	23	6.8	19
		06/24/07	7.4	24	6.8	19
		06/25/07	7.2	24	6.8	19
		06/26/07	7.2	24	6.8	19
		06/27/07	7.3	24	6.8	19
		06/28/07	7.3	24	6.7	19
		06/29/07	7.3	24	6.7	19
		06/30/07	7.1	24	6.7	18
	7				6.7	18
		07/01/07	7.4	24	6.7	18
		07/02/07	7.3	24	6.7	18
		07/03/07	7.1	24	6.7	18
		07/04/07	7.2	24	6.7	18
		07/05/07	7.1	24	6.7	18
		07/06/07	7.1	24	6.7	18
		07/07/07	7.1	25	6.7	18
		07/08/07	7.1	25	6.7	18
		07/09/07	7.2	25	6.7	18
		07/10/07	7.0	25	6.7	18
		07/11/07	7.0	25	6.7	18
		07/12/07	7.0	25	6.7	18
		07/13/07	7.2	25	6.7	18
		07/14/07	6.9	24	6.7	18

Noman M. Cole, Jr. Pollution Control Plant
April 2003 - October 2007

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		07/15/07	6.8	26	6.7	18
		07/16/07	7.1	25	6.7	18
		07/17/07	7.1	25	6.7	18
		07/18/07	7.1	26	6.7	18
		07/19/07	7.0	25	6.7	18
		07/20/07	7.0	25	6.7	18
		07/21/07	7.1	25	6.7	18
		07/22/07	7.1	25	6.7	18
		07/23/07	7.2	25	6.7	18
		07/24/07	7.1	25	6.7	18
		07/25/07	7.0	25	6.7	18
		07/26/07	7.0	26	6.7	18
		07/27/07	7.0	25	6.7	18
		07/28/07	7.0	26	6.7	18
		07/29/07	7.2	26	6.7	18
		07/30/07	7.1	25	6.7	18
		07/31/07	7.0	26	6.7	18
	8				6.7	18
		08/01/07	7.2	26	6.7	18
		08/02/07	7.1	24	6.7	18
		08/03/07	7.0	26	6.7	18
		08/04/07	7.2	26	6.7	18
		08/05/07	7.2	26	6.7	18
		08/06/07	7.0	26	6.7	18
		08/07/07	6.9	26	6.7	18
		08/08/07	7.0	26	6.7	18
		08/09/07	6.9	27	6.7	18
		08/10/07	7.1	26	6.7	18
		08/11/07	6.9	26	6.7	18
		08/12/07	6.9	26	6.7	18
		08/13/07	7.2	26	6.7	18
		08/14/07	7.1	26	6.7	18
		08/15/07	7.2	26	6.7	18
		08/16/07	7.1	26	6.7	17
		08/17/07	7.1	26	6.7	17
		08/18/07	7.2	26	6.7	17
		08/19/07	7.2	26	6.7	17
		08/20/07	7.2	26	6.7	17
		08/21/07	7.1	25	6.7	17
		08/22/07	7.0	25	6.6	17
		08/23/07	7.1	26	6.6	17
		08/24/07	7.1	26	6.6	17
		08/25/07	6.9	26	6.6	17
		08/26/07	7.2	25	6.6	17
		08/27/07	7.3	26	6.6	17
		08/28/07	7.3	26	6.6	17
		08/29/07	7.4	26	6.6	17
		08/30/07	7.2	26	6.6	17
		08/31/07	7.4	26	6.6	17
	9				6.6	17
		09/01/07	7.5	26	6.6	17
		09/02/07	7.5	26	6.6	17
		09/03/07	7.4	26	6.6	17
		09/04/07	7.2	26	6.6	17
		09/05/07	7.3	26	6.6	17
		09/06/07	7.4	26	6.6	17
		09/07/07	7.3	26	6.6	17
		09/08/07	7.3	27	6.6	17
		09/09/07	7.0	26	6.6	17
		09/10/07	7.1	27	6.6	17
		09/11/07	7.2	26	6.6	17
		09/12/07	7.3	26	6.6	17
		09/13/07	7.3	26	6.6	17
		09/14/07	7.2	26	6.6	17
		09/15/07	7.2	26	6.6	17
		09/16/07	7.0	25	6.5	16
		09/17/07	7.2	24	6.5	16
		09/18/07	7.2	25	6.5	16
		09/19/07	7.2	25	6.5	16
		09/20/07	7.1	25	6.5	16
		09/21/07	7.2	25	6.5	16

Noman M. Cole, Jr. Pollution Control Plant
April 2003 - October 2007

Year	Month	Collection Date	Oufall pH	Outfall Temperature	Sorted pH	Sorted Temperature
		09/22/07	7.1	25	6.5	16
		09/23/07	7.0	25	6.5	16
		09/24/07	7.3	26	6.5	16
		09/25/07	7.3	26	6.5	16
		09/26/07	7.1	25	6.4	16
		09/27/07	7.0	26	6.3	16
		09/28/07	7.0	26	6.3	15
		09/29/07	7.0	24		
		09/30/07	7.1	24		
	10					
		10/01/07	7.1	25		
		10/02/07	7.3	25		
		10/03/07	7.1	26		
		10/04/07	7.1	26		
		10/05/07	7.0	26		
		10/06/07	7.0	26		
		10/07/07	7.0	26		
		10/08/07	7.1	26		
		10/09/07	7.1	26		
		10/10/07	7.4	26		
		10/11/07	7.4	25		
		10/12/07	7.0	24		
		10/13/07	7.1	24		
		10/14/07	7.3	24		
		10/15/07	7.3	24		
		10/16/07	7.2	24		
		10/17/07	7.2	25		
		10/18/07	7.1	25		
		10/19/07	7.2	25		
		10/20/07	6.7	24		
		10/21/07	7.0	23		
		10/22/07	7.0	24		
		10/23/07	7.0	25		
		10/24/07	7.0	25		
		10/25/07	7.1	24		
		10/26/07	7.0	24		
		10/27/07	7.2	23		
		10/28/07	7.1	21		
		10/29/07	7.0	23		
		10/30/07	7.0	22		
		10/31/07	6.9	22		

DEQ's Water Quality Data for 1aPOH005.36 (Route 1 Bridge) - Pohick Creek
Lat 38 42 4 / Long 77 12 36
(Approximately 0.57 Rivermiles Upstream from Noman Cole PCP's Discharge Point)
September 2001 through March 2008

Collection Date	Field pH	Temp (Celsuis)	pH Sorted		Temp Sorted
9/6/2001	7.28	19.64	8.21		25.36
12/19/2001	6.35	7.18	8.07		23.77
2/26/2002	6.67	6.95	8.01		23.37
5/22/2002	7.18	12.36	8.01	90th percentile	23.3
6/19/2002	7.01	19.9	7.7		21.7
3/20/2003	7.25	7.63	7.41		19.9
8/4/2003	7.41	23.3	7.4		19.64
10/7/2003	6.61	13.77	7.39		19.5
12/16/2003	8.07	3.64	7.37		16.9
2/4/2004	8.01	1.09	7.35		13.77
4/8/2004	7.37	10.83	7.28		12.67
6/8/2004	7.39	19.5	7.28		12.36
8/5/2004	8.21	23.77	7.25		10.83
10/12/2004	7.28	12.67	7.18		8.97
12/6/2004	7.35	7.62	7.14		8.86
7/19/2005	7.14	25.36	7.14		7.63
8/30/2005	7.14	23.37	7.11		7.62
9/22/2005	6.96	21.7	7.01		7.18
11/28/2005	7.11	8.97	6.96		6.95
1/18/2006	8.01	8.86	6.7		5.5
3/14/2006	7.7	16.9	6.67		5.1
1/30/2008	7.4	5.5	6.61		3.64
3/3/2008	6.7	5.1	6.35		1.09

November 2001 - March 2008

Collection Date	Field pH	Temp (Celsuis)	pH Sorted		Temp Sorted
9/6/2001	7.28	19.64	8.07		19.64
12/19/2001	6.35	7.18	8.01	90th percentile	16.9
2/26/2002	6.67	6.95	8.01		12.67
3/20/2003	7.25	7.63	7.7		8.97
12/16/2003	8.07	3.64	7.4		8.86
2/4/2004	8.01	1.09	7.35		7.63
10/12/2004	7.28	12.67	7.28		7.62
12/6/2004	7.35	7.62	7.28		7.18
11/28/2005	7.11	8.97	7.25		6.95
1/18/2006	8.01	8.86	7.11		5.5
3/14/2006	7.7	16.9	6.7		5.1
1/30/2008	7.4	5.5	6.67		3.64
3/3/2008	6.7	5.1	6.35		1.09

April 2002 - October 2005

Collection Date	Field pH	Temp (Celsuis)	pH sorted		Temp Sorted
5/22/2002	7.18	12.36	8.21		25.36
6/19/2002	7.01	19.9	7.41	90th percentile	23.77
8/4/2003	7.41	23.3	7.39		23.37
10/7/2003	6.61	13.77	7.37		23.3
4/8/2004	7.37	10.83	7.28		21.7
6/8/2004	7.39	19.5	7.18		19.9
8/5/2004	8.21	23.77	7.14		19.5
10/12/2004	7.28	12.67	7.14		13.77
7/19/2005	7.14	25.36	7.01		12.67
8/30/2005	7.14	23.37	6.96		12.36
9/22/2005	6.96	21.7	6.61		10.83

DEQ's Water Quality Hardness Data for 1aPOH005.36 (Route 1 Bridge) - Pohick Creek
Lat 38 42 4 / Long 77 12 36
(Approximately 0.57 Rivermiles Upstream from Noman Cole PCP's Discharge Point)
May 1985 through March 2005

Collection Date	Value
5/13/1985	26
6/10/1985	32
7/8/1985	40
8/6/1985	46
11/19/1985	40
12/9/1985	44
9/6/2001	42
12/19/2001	32.8
2/26/2002	50.8
5/22/2002	41.3
6/19/2002	28.4
3/20/2003	41.7
3/9/2005	44
Average =	**39**

For the months of April through October

Collection date	Value
5/13/1985	26
6/10/1985	32
7/8/1985	40
8/6/1985	46
9/6/2001	42
5/22/2002	41.3
6/19/2002	28.4
3/20/2003	41.7
3/9/2005	44
Average =	**38**

For the months of November through March

Collection date	Value
11/19/1985	40
12/9/1985	44
12/19/2001	32.8
2/26/2002	50.8
Average =	**42**

VaFWIS - Department of Game and Inland Fisheries

38,41,52.9 -77,12,02.9
is the Search Point
Submit Cancel

Search Point
- **Change** to "clicked" map point
- **Fixed** at 38,41,52.9 -77,12,02.9

Show Position Rings
Yes No
1 mile and 1/4 mile at the **Search Point**

Show Search Area
Yes No
2 Search distance miles radius

Search Point is at map center

Base Map Choices
Topography

Map Overlay Choices
Current List: Position, Search

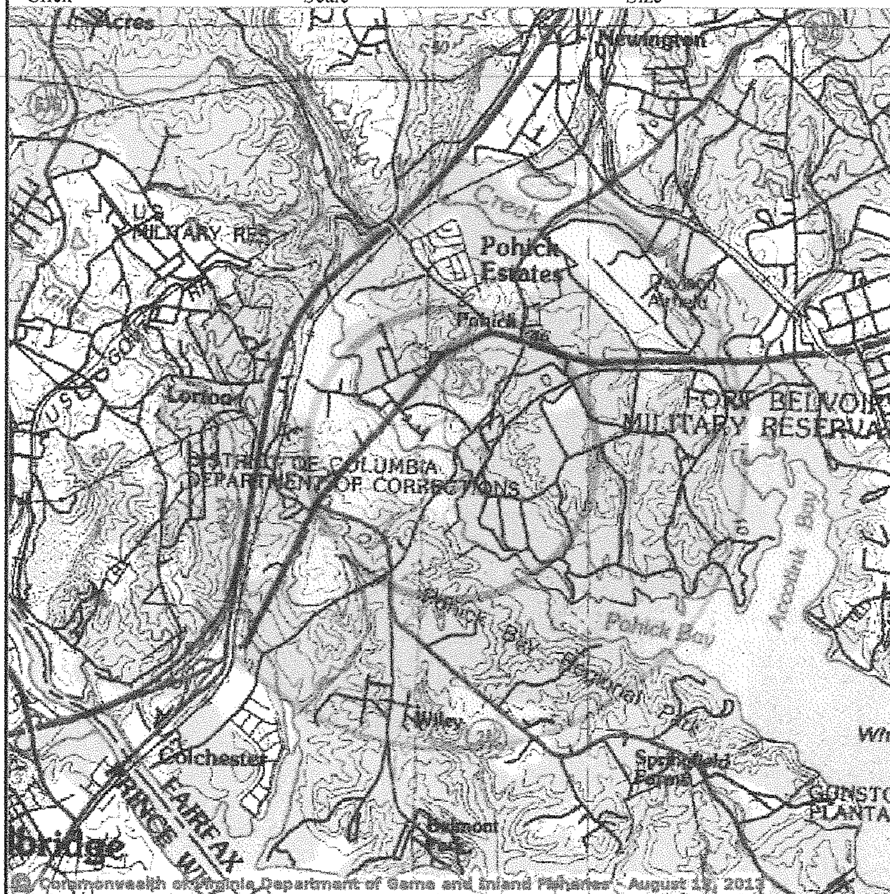
Map Overlay Legend

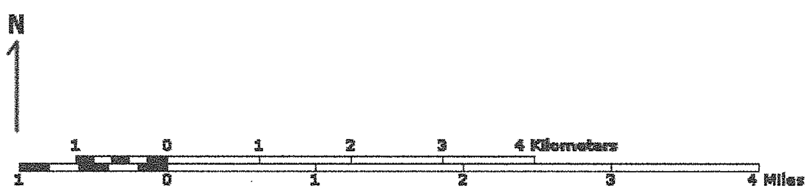
Position Rings 1 mile and 1/4 mile at the Search Point

2 mile radius Search Area

|Refresh Browser Page|

Map Click Pan | Map Scale In Zoom Out | Screen Size Small Size Big | Help





Point of Search 38,41,52.9 -77,12,02.9
Map Location 38,41,52.9 -77,12,02.9

Select **Coordinate System:**
- Degrees,Minutes,Seconds Latitude - Longitude
- Decimal Degrees Latitude - Longitude
- Meters UTM NAD83 East North Zone
- Meters UTM NAD27 East North Zone

Base Map source: USGS 1:100,000 topographic maps (see Microsoft terraserver-usa.com for details)

Map projection is UTM Zone 18 NAD 1983 with left 303811 and top 4290369. Pixel size is 16 meters . Coordinates displayed are Degrees, Minutes, Seconds North and West.Map is currently displayed as 600 columns by 600 rows for a total of 360000 pixles. The map display represents 9600 meters east to west by 9600 meters north to south for a total of 92.1 square kilometers. The map display represents 31501 feet east to west by 31501 feet north to south for a total of 35.5

Attachment 8

	square miles. Topographic maps and Black and white aerial photography for year 1990+- are from the United States Department of the Interior, United States Geological Survey. Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network. Shaded topographic maps are from TOPO! ©2006 National Geographic http://www.national.geographic.com/topo All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.
	map assembled 2013-08-12 12:49:50 (qa/qc December 5, 2012 8:04 - tn=478076 dist=3218 I) $poi=38.6980500 -77.2008300

| DGIF | Credits | Disclaimer | Contact shiri.dressler@dgif.virginia.gov |Please view our privacy policy |

VaFWIS Initial Project Assessment Report Compiled on 8/12/2013, 12:52:40 PM

Help

Known or likely to occur within a **2 mile radius around point 38,41,52.9 -77,12,02.9**
in **059 Fairfax County, VA**

View Map of Site Location

578 Known or Likely Species ordered by Status Concern for Conservation
(displaying first 29) (29 species with Status* or Tier I** or Tier II**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name	Confirmed	Database(s)
010032	FESE	II	Sturgeon, Atlantic	Acipenser oxyrinchus		BOVA
060006	SE	II	Floater, brook	Alasmidonta varicosa		BOVA
030062	ST	I	Turtle, wood	Glyptemys insculpta	Yes	BOVA,Habitat,SppObs
040129	ST	I	Sandpiper, upland	Bartramia longicauda		BOVA
040293	ST	I	Shrike, loggerhead	Lanius ludovicianus		BOVA
040379	ST	I	Sparrow, Henslow's	Ammodramus henslowii		BOVA
100155	FSST	I	Skipper, Appalachian grizzled	Pyrgus wyandot		BOVA
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans		BOVA
010038	FC	IV	Alewife	Alosa pseudoharengus	Yes	BOVA,SppObs
010045	FC		Herring, blueback	Alosa aestivalis	Yes	BOVA,SppObs
100248	FS	I	Fritillary, regal	Speyeria idalia idalia		BOVA
040093	FS	II	Eagle, bald	Haliaeetus leucocephalus	Yes	BOVA,BECAR,Habitat,BAEANests
100154	FS	II	Butterfly, Persius duskywing	Erynnis persius persius		BOVA
060029	FS	III	Lance, yellow	Elliptio lanceolata		BOVA
030063	CC	III	Turtle, spotted	Clemmys guttata	Yes	BOVA,SppObs
030012	CC	IV	Rattlesnake, timber	Crotalus horridus		BOVA

010077		I	Shiner, bridle	Notropis bifrenatus	Yes	Habitat,SppObs
040372		I	Crossbill, red	Loxia curvirostra		BOVA
040225		I	Sapsucker, yellow-bellied	Sphyrapicus varius		BOVA
040319		I	Warbler, black-throated green	Dendroica virens		BOVA
040306		I	Warbler, golden-winged	Vermivora chrysoptera		BOVA
040038		II	Bittern, American	Botaurus lentiginosus		BOVA,Habitat
040052		II	Duck, American black	Anas rubripes	Yes	BOVA,SppObs
040029		II	Heron, little blue	Egretta caerulea caerulea		BOVA
040213		II	Owl, northern saw-whet	Aegolius acadicus		BOVA
040105		II	Rail, king	Rallus elegans		BOVA,Habitat
040320		II	Warbler, cerulean	Dendroica cerulea		BOVA
040304		II	Warbler, Swainson's	Limnothlypis swainsonii		BOVA
040266		II	Wren, winter	Troglodytes troglodytes		BOVA

To view **All 578 species** View 578

* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

View Map of All Query Results from All Observation Tables

Bat Colonies or Hibernacula: **Not Known**

Anadromous Fish Use Streams (2 records)

View Map of All Anadromous Fish Use Streams

Stream ID	Stream Name	Reach Status	Anadromous Fish Species			View Map
			Different Species	Highest TE *	Highest Tier **	
C2	Accotink creek	Confirmed	2	FC	IV	Yes
C62	Pohick creek	Confirmed	3	FC	IV	Yes

Impediments to Fish Passage (1 records)

View Map of All Fish Impediments

ID	Name	River	View Map
1292	I-95	GILES RUN	Yes

Colonial Water Bird Survey

N/A

Threatened and Endangered Waters

N/A

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

are present. View Map of Bald Eagle Concentration Areas and Roosts

(3 records)

BECAR ID	Observation Year	Authority	Type	Comments	View Map
54	2006 - 2007	VDGIF, Center for Conservation Biology	Summer Concentration Area	Eagle_use Low	Yes
55	2006 - 2007	VDGIF, Center for Conservation Biology	Summer Concentration Area	Eagle_use Moderate	Yes
56	2006 - 2007	VDGIF, Center for Conservation Biology	Winter Concentration Area	Eagle_use High	Yes

Bald Eagle Nests (5 records)

View Map of All Query Results Bald Eagle Nests

Nest	N Obs	Latest Date	DGIF Nest Status	View Map
FF0402	5	May 3 2006	HISTORIC	Yes
FF0601	5	Apr 29 2007	HISTORIC	Yes
FF0801	8	Apr 24 2011	RECENTLY ACTIVE	Yes
FF9001	2	Jan 1 1991	HISTORIC	Yes
FF9202	18	Apr 27 2000	HISTORIC	Yes

Displayed 5 Bald Eagle Nests

Habitat Predicted for Aquatic WAP Tier I & II Species (4 Reaches)

View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species

Stream Name	Tier Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Accotink Creek (20700102)		010077		I	Shiner, bridle	Notropis bifrenatus	Yes
(20700102)	ST	030062	ST	I	Turtle, wood	Glyptemys insculpta	Yes
Rocky Branch (20700102)	ST	030062	ST	I	Turtle, wood	Glyptemys insculpta	Yes
South Run (20700102)	ST	030062	ST	I	Turtle, wood	Glyptemys insculpta	Yes

Habitat Predicted for Terrestrial WAP Tier I & II Species (3 Species)

View Map of Combined Terrestrial Habitat Predicted for 3 WAP Tier I & II Species Listed Below

ordered by Status Concern for Conservation

BOVA Code	Status*	Tier**	Common Name	Scientific Name	View Map
040093	FS	II	Eagle, bald	Haliaeetus leucocephalus	Yes
040038		II	Bittern, American	Botaurus lentiginosus	Yes
040105		II	Rail, king	Rallus elegans	Yes

Public Holdings: (1 names)

Name	Agency	Level
Fort Belvoir Military Reservation	U.S. Dept. of Army	Federal

Compiled on 8/12/2013, 12:52:41 PM I478076.0 report=IPA searchType= R dist= 3218 poi= 38,41,52.9 -77,12,02.9

PixelSize=64; Anadromous=0.030513; BECAR=0.075052; Bats=0.024099; Buffer=0.192333; County=0.084062; Impediments=0.034559; Init=0.229639; PublicLands=0.051778; SppObs=6.212068;

Crowther, Joan (DEQ)

From:	Mackert, Susan (DEQ)
Sent:	Friday, May 31, 2013 2:40 PM
To:	Crowther, Joan (DEQ)
Cc:	Daub, Elleanore (DEQ); Baird, Alice (DCR)
Subject:	FW: VA0025364, Noman Cole Pollution Control Plant
Attachments:	64532, DEQ VA0025364, Noman Cole Pollution Control Plant.pdf

Joan,

Please find attached correspondence from DCR on the project submittal for Noman Cole.

Alli,

This confirms receipt of comments from DCR.

Thanks,
Susan

From: nhreview (DCR)
Sent: Friday, May 31, 2013 2:23 PM
To: Mackert, Susan (DEQ)
Subject: VA0025364, Noman Cole Pollution Control Plant

Ms. Mackert,

Please find attached the DCR-DNH comments for the above referenced project. The comments are in pdf format and can be printed for your records. Also species rank information is available at http://www.dcr.virginia.gov/natural_heritage/help.shtml for your reference.

Please note an updated information services order form is located on the Natural Heritage website at: http://dcrintra.dcr.virginia.gov/DCR_Public/NH/NHServiceFormNF.cfm

Please send a confirmation e-mail upon receipt of our comments. Let us know if you have any questions.

Thank you for your request.

Alli Baird, PLA, ASLA
Dept of Conservation & Recreation
Division of Natural Heritage
217 Governor Street
Richmond, VA 23219
804-692-0984

25th ANNIVERSARY 1986-2011
VIRGINIA NATURAL HERITAGE PROGRAM

Douglas W. Domenech
Secretary of Natural Resources

David A. Johnson
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

Division of Natural Heritage
217 Governor Street
Richmond, Virginia 23219-2010
(804) 786-7951

May 31, 2013

Susan Mackert
DEQ-NRO
13901 Crown Court
Woodbridge, VA 22193

Re: VA0025364, Noman Cole Pollution Control Plant

Dear Ms. Mackert:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in our files, Laura's clubtail (*Stylurus laurae*, G4/S2/NL/NL) has been historically documented within the project site. Laura's clubtail, a state rare dragonfly, ranges from Ohio south to Florida with westward records to Texas (Kondratieff, 2000). In Virginia, there are records across the Piedmont and west to the Ridge and Valley region. Its habitat consists of moderated gradient streams with many shallow riffles and runs (NatureServe, 2009).

Though somewhat tolerant of decreased water quality, threats include activities which alter the water flow or substrate such as: impoundments, channelization, dredging, siltation, agricultural non-point pollution, and municipal and industrial pollution. In addition, timber harvest may increase siltation and cause a decrease in dissolved oxygen as canopy cover is removed and water temperature rises (NatureServe, 2009).

In addition, River bulrush (*Bolboschoenus fluviatilis*, G5/S2/NL/NL) has been documented downstream from the project site. River bulrush, a state-rare plant species, inhabits fresh tidal marshes of the coastal plain of Virginia. This species forms predominantly sterile colonies that spread by rhizomes. Water pollution and sedimentation, sea level rise, and invasive species such as *Phragmites* australis pose the greatest threats to populations of this sedge. Nine populations of river bulrush are believed to be extant in Virginia.

To minimize impacts to aquatic resources, DCR recommends the use of uv/ozone to replace chlorination disinfection and utilization of new technologies as they become available to improve water quality.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

New and updated information is continually added to Biotics. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

The VDGIF maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from http://vafwis.org/fwis/ or contact Gladys Cason (804-367-0909 or Gladys.Cason@dgif.virginia.gov).

Should you have any questions or concerns, feel free to contact me at 804-692-0984. Thank you for the opportunity to comment on this project.

Sincerely,

Alli Baird

Alli Baird, LA, ASLA
Coastal Zone Locality Liaison

Literature Cited

Kondratieff, Boris C. (coordinator). 2000. Dragonflies and Damselflies (Odonata) of the United States. Jamestown, ND: Northern Prairie Wildlife Research Center Online. http://www.npwrc.usgs.gov/resource/distr/insects/dfly/index.htm (Version 12DEC2003). Accessed 25Mar2010.

NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 25, 2010).

1998

```
E Analysis of the LP NOV-MAR 67 MGD effluent dat  for Ammonia as Nitrogen

 The statistics for Ammonia as Nitrogen are:
    Number of values             =  1
    Quantification level         =  .2
    Number < quantification =  0
    Expected value               =  10
    Variance                     =  36.00001
    C.V.                         =  .6
    97th percentile              =  24.33418
    Statistics used              = Reasonable potential assumptions - Type 2 data

 The WLAs for Ammonia as Nitrogen are:
    Acute WLA             =  13.95 ✓
    Chronic WLA           =  2.15 ✓
    Human Health WLA      = ----

 The limits are based on chronic toxicity and  30 samples/month.

    Maximum daily limit    =  4.337991
    Average weekly limit   =  2.616817 = 2.6 mg/l
    Average monthly limit  =  2.15 = 2.2 mg/l

      Note: The maximum daily limit applies to industrial dischargers
            The average weekly limit applies to domestic discharges
            The average monthly limit applies to both.

  The Data are
  10
```

2.2 mg/l × 67 MGD × 3.785 = 558 kg/d monthly average

2.6 mg/l × 67 MGD × 3.785 = 659 kg/d weekly average maximum

FACILITY: Lower Potomac
VPDES #: 25364

Ammonia Calculation - Acute Ammonia Criteria for Freshwater

	Temperature	pH		TIER INFORMATION:	Apr-Oct
DATA ENTRY:->	26	7.40	90th Percentiles		

FT
FT=10^((.03)(20-T)) = 0.6606934

FPH
FPH=1 if 8.0<=pH<=9.0 = NA
FPH=((1+10^(7.4-pH))/1.25 if 6.5<=pH<8.0 = 1.6000000
FPH= **1.6**

Acute Criteria Concentration=.52/FT/FPH/2 = **0.2459537**

Conversion from un-ionized to Total Ammonia can be calculated by using the following formulas:
Total Acute Ammonia Criteria = Calculated un-ionized ammonia criteria divided by fraction of un-ionized Ammonia
Where: Fraction of un-ionized ammonia = 1/(10^(pKa-pH) +1) **Fraction= 0.0151059**
where: pKa = 0.09018 + (2729.92/273.2 + temperature 'C,) **pKa = 9.2142442**
Total Acute Ammonia Criteria = Calculated un-ionized Ammonia Criteria divided by fraction of un-ionized Ammonia
Total Acute Ammonia Criteria = **0.2459537** / **0.0151058575** = Total Ammonia = **16.2820087** mg/l

Total Ammonia is then converted to Ammonia-Nitrogen.
TOTAL ACUTE N-NH3 16.2820087 X .824 13.4163752 MG/L = 13.42

Ammonia Calculation - Chronic Ammonia Criteria for Freshwater

	Temperature	pH	TIER INFORMATION:	Apr-Oct
DATA ENTRY:->	26	7.40		

FT
FT=10^((.03)(20-T)) = 0.6606934

FPH
FPH=1 if 8.0<=pH<=9.0 = NA
FPH=((1+10^(7.4-pH))/1.25 if 6.5<=pH<8.0 = 1.6000000
FPH= **1.6**

Ratio
Ratio = 13.5 if 7.7<=pH<=9.0 = NA
Ratio = 20.25 x (10^(7.7-pH))/(1+(10^(7.4-pH)) if 6.5<=pH<7.7 = 20.2020309
Ratio = **20.202031**

Chronic Criteria Concentration=.8/FT/FPH/RATIO = **0.0374606**

Conversion from un-ionized to Total Ammonia can be calculated by using the following formulas:
Total Acute Ammonia Criteria = Calculated un-ionized ammonia criteria divided by fraction of un-ionized Ammonia
Where: Fraction of un-ionized ammonia = 1/(10^(pKa-pH) +1) **Fraction= 0.0151059**
where: pKa = 0.09018 + (2729.92/273.2 + temperature 'C) **pKa = 9.2142442**
Total Acute Ammonia Criteria=Calculated un-ionized Ammonia Criteria divided by fraction of un-ionized Ammonia
Total Acute Ammonia Criteria = **0.0374606** / **0.0151059** = Total Ammonia = **2.47987385 mg/l**

Total Ammonia is then converted to Ammonia-Nitrogen.
TOTAL CHRONIC N-NH3 2.4798738 X .824 2.0434161 MG/L = 2.04

Revised 12/03/97: (i:wdbr1\common\permits\model\newamm)

Apr-Oct			pH	Temp
April 1991	6.9	17	[illegible]	16
	7.1	17		16
	6.9	17		16
	7.1	18	6.7	16
	7.2	18	6.7	16
	7.2	19	6.7	16
	7.1	20	6.7	16
	7.1	21	6.7	16
	7	21	6.7	16
	7.1	21	6.7	16
	7	19	6.7	17
	6.8	19	6.8	17
	7.2	19	6.8	17
	7.1	18	6.8	17
	7.2	19	6.8	17
	7.1	19	6.8	17
	6.8	20	6.8	17
	7.1	21	6.8	17
	7.2	19	6.8	17
	7.4	19	6.8	17
	7.2	19	6.8	17
	7.2	19	6.8	17
	7.1	20	6.8	17
	7.1	21	6.8	17
	7.1	20	6.8	17
	7	20	6.8	17
	6.9	25	6.8	17
	7.2	21	6.8	17
	7.1	21	6.8	17
	7.1	21	6.8	17
May1991	7.2	21	6.8	17
	7.2	22	6.9	17
	7.3	20	6.9	17
	7.3	20	6.9	17
	7.4	21	6.9	17
	7.1	21	6.9	17
	7.1	21	6.9	17
	7.2	21	6.9	17
	7.1	21	6.9	17
	7.2	21	6.9	17
	7.2	22	6.9	17
	7.3	22	6.9	17
	7.1	22	6.9	17
	7.1	22	6.9	18
	7.4	22	6.9	18
	7.4	22	6.9	18
	7.3	22	6.9	18
	7.4	22	6.9	18
	7	22	6.9	18
	7.4	21	6.9	18
	7.3	21	6.9	18
	7.4	23	6.9	18
	7.1	23	6.9	18
	7.3	24	6.9	18
	7.2	23	6.9	18
	7.3	23	6.9	18
	7.2	24	6.9	18
	7.3	24	6.9	18
	7.2	23	6.9	18
	7.2	24	6.9	18
	7.2	24	6.9	18
June1991	7.2	24	6.9	18
	7.3	23	6.9	18
	7.3	23	6.9	18
	7.3	23	6.9	18
	7.3	23	6.9	18
	7.4	23	6.9	18
	7.3	23	6.9	18
	7.3	23	6.9	18
	7.4	24	7	18
	7.4	23	7	18
	7.3	24	7	18
	7.4	24	7	18
	7.4	24	7	18
	7.4	26	7	18
	7.4	24	7	18
	7.3	24	7	18
	7.6	30	7	18
	7.5	24	7	18
	7.6	24	7	18
	7.3	23	7	18
	7.4	24	7	18
	7.5	24	7	18
	7.4	23	7	18
	7.6	26	7	18
	7.5	23	7	18
	7.5	25	7	18
	7.6	25	7	18
	7.9	28	7	18
	7.6	26	7	18
	7.6	29	7	18
July1991	7.5	25	7	18

Apr-Oct			pH	Temp
	7.5	25	7	18
	7.5	26		18
	7.4	26		18
	7.5	24	7	18
	7.5	25	7	18
	7.5	29	7	18
	7.4	25	7	19
	7.5	26	7	19
	7.5	26	7	19
	7.6	25	7	19
	7.3	26	7	19
	7.4	22	7	19
	7.4	24	7	19
	7.4	24	7	19
	7.4	25	7	19
	7.5	26	7	19
	7.4	25	7	19
	7.5	26	7	19
	7.4	26	7	19
	7.4	25	7	19
	7.4	27	7	19
	7.4	26	7	19
	7.3	27	7	19
	7.4	26	7	19
	7.4	26	7	19
	7.2	23	7	19
	7	26	7	19
	7.1	22	7	19
	7.2	24	7	19
	7.1	27	7	19
August1991	7.2	25	7	19
	7.2	27	7	19
	7.2	26	7	19
	7.8	27	7	19
	7.3	26	7	19
	7.5	27	7	19
	7.5	26	7	19
	7.2	26	7	19
	7.5	26	7	19
	7.4	26	7	19
	7.4	26	7	19
	7.4	26	7	19
	7.3	26	7	19
	7.4	26	7	19
	7.4	26	7	19
	7.5	26	7	19
	7.5	26	7	19
	7.4	26	7	19
	7.4	26	7	19
	7.4	26	7	19
	7.5	27	7	19
	7.5	26	7	19
	7.3	26	7	19
	7.2	26	7	19
	7.4	26	7	19
	7.2	26	7	19
	7.2	25	7	19
	7.1	26	7	19
	7.2	26	7	19
	7.2	27	7	19
	7.2	27	7	19
September1991	7.4	26	7	19
	7.3	26	7	19
	7.2	25	7	19
	7.2	26	7	19
	7.3	26	7	19
	7.3	26	7	19
	7.3	25	7	19
	7.3	25	7	19
	7.4	26	7	19
	7.4	26	7	19
	7.4	26	7	19
	7.4	26	7	19
	7.3	26	7	19
	7.1	26	7	19
	6.9	26	7	19
	7.3	26	7	19
	7.2	26	7	19
	7.2	28	7	19
	7.2	27	7	19
	7.3	25	7	19
	7.2	25	7	19
	7.4	25	7	19
	7.3	25	7	19
	7.2	26	7	19
	7	25	7	19
	7	25	7	20
	7.2	25	7	20
	7.3	25	7	20
	7.2	24	7	20
	7.3	25	7	20

Apr-Oct			pH	Temp
October1991	7.3	25	7	20
	7.4	26		20
	7.3	25		20
	7.3	25	7	20
	7.3	25	7	20
	7.3	24	7	20
	7.2	23	7	20
	7.2	22	7	20
	7.2	23	7	20
	7.2	23	7	20
	7.4	24	7	20
	7.4	23	7	20
	7.4	24	7	20
	7.3	22	7	20
	7.4	23	7	20
	6.8	23	7	20
	7.2	22	7	20
	7.4	22	7	20
	7.5	23	7	20
	7.4	23	7	20
	7.5	23	7	20
	7.4	22	7	20
	7.4	23	7	20
	7.3	22	7	20
	7.4	24	7	20
	7.5	24	7	20
	7.3	26	7	20
	7.4	24	7	20
	7.4	24	7	20
	7.4	23	7	20
	7.4	23	7	20
April1992	7	18	7	20
	6.9	18	7	20
	7	19	7	20
	6.9	18	7	20
	6.9	17	7	20
	7	17	7.1	20
	7	19	7.1	20
	7.4	18	7.1	20
	7	18	7.1	20
	7	18	7.1	20
	6.8	20	7.1	20
	7.1	20	7.1	20
	7	18	7.1	20
	7	17	7.1	20
	7	18	7.1	20
	7	18	7.1	20
	7	20	7.1	20
	7	20	7.1	20
	6.8	20	7.1	20
	7	19	7.1	20
	6.3	20	7.1	20
	6.7	22	7.1	20
	6.5	25	7.1	20
	6.8	25	7.1	20
	7	20	7.1	20
	7.1	19	7.1	20
	7	19	7.1	20
	6.9	19	7.1	20
	7	18	7.1	20
	7	19	7.1	20
May1992	7	19	7.1	20
	6.9	21	7.1	20
	6.8	21	7.1	20
	6.7	20	7.1	20
	7.1	20	7.1	20
	7.1	20	7.1	20
	7.1	19	7.1	20
	7.1	19	7.1	20
	6.5	19	7.1	21
	7.1	19	7.1	21
	7.1	21	7.1	21
	7	20	7.1	21
	7	21	7.1	21
	7	21	7.1	21
	6.8	21	7.1	21
	7	20	7.1	21
	6.8	21	7.1	21
	7	22	7.1	21
	6.9	22	7.1	21
	6.9	21	7.1	21
	7.2	22	7.1	21
	7.1	22	7.1	21
	6.8	21	7.1	21
	7	23	7.1	21
	7	22	7.1	21
	7.1	20	7.1	21
	7.2	20	7.1	21
	7	21	7.1	21
	7	21	7.1	21
	7.4	21	7.1	21
	6.8	21	7.1	21

Apr-Oct			pH	Temp
June1992	7.1	22	7.1	21
	7	22		21
	7	22		21
	7.1	22	7.1	21
	7	22	7.1	21
	7	22	7.1	21
	7	23	7.1	21
	7.1	22	7.1	21
	7	23	7.1	21
	7.2	23	7.1	21
	7.1	22	7.1	21
	7.3	23	7.1	21
	7.1	22	7.1	21
	6.9	23	7.1	21
	7.1	23	7.1	21
	7.2	23	7.1	21
	7.5	22	7.1	21
	7.6	23	7.1	21
	7.2	24	7.1	21
	7.3	24	7.1	21
	7.4	23	7.1	21
	7.3	23	7.1	21
	7.5	23	7.1	21
	7.2	23	7.1	21
	7.2	23	7.1	21
	7.1	23	7.1	21
	7.2	23	7.1	21
	7.2	24	7.1	21
	7.4	23	7.1	21
	7.5	23	7.1	21
July1992	7.2	24	7.1	21
	7.2	25	7.1	21
	7.2	23	7.1	21
	7.2	24	7.1	21
	7.2	24	7.1	21
	7.2	21	7.1	21
	7.2	22	7.1	21
	7.2	25	7.1	21
	7.3	22	7.1	21
	7.3	25	7.1	21
	7.2	25	7.1	21
	7.5	25	7.1	21
	7.2	24	7.1	21
	7.5	25	7.1	21
	7.2	24	7.1	21
	7.2	25	7.1	21
	7	25	7.1	21
	7.2	26	7.1	21
	7.1	25	7.1	21
	7.1	25	7.1	21
	7.3	25	7.1	21
	7.1	26	7.1	21
	7.1	24	7.1	21
	7.1	25	7.1	21
	7	25	7.1	21
	6.7	24	7.1	21
	7.2	25	7.1	21
	7.2	25	7.1	21
	7.1	25	7.1	21
	7.2	26	7.1	21
	7.1	25	7.1	21
August1992	6.7	25	7.1	22
	7	25	7.1	22
	7.1	26	7.1	22
	7	26	7.1	22
	7	25	7.1	22
	7.1	24	7.1	22
	7	25	7.1	22
	7.2	25	7.1	22
	6.8	25	7.1	22
	7.1	27	7.1	22
	7.2	26	7.1	22
	6.8	26	7.1	22
	6.9	25	7.1	22
	7	25	7.1	22
	6.8	24	7.1	22
	6.9	24	7.1	22
	7	24	7.1	22
	6.9	24	7.1	22
	7	25	7.1	22
	7	25	7.1	22
	7	25	7.1	22
	7	26	7.1	22
	6.9	25	7.1	22
	7.1	25	7.1	22
	7.1	26	7.1	22
	7.1	26	7.1	22
	7	26	7.1	22
	7.1	26	7.1	22
	7.1	25	7.1	22
	7	24	7.1	22
	7.1	26	7.1	22

Apr-Oct			pH	Temp
September1992	7.2	25	7.1	22
	7.3	25		22
	7.2	25	7.1	22
	7.5	25	7.1	22
	7.3	25	7.1	22
	7.2	24	7.1	22
	7.2	24	7.1	22
	7.3	23	7.1	22
	7.3	25	7.1	22
	7.2	26	7.1	22
	7.3	26	7.1	22
	7.4	24	7.1	22
	7.4	23	7.1	22
	7.3	25	7.1	22
	7.5	24	7.1	22
	7.2	24	7.1	22
	7.3	25	7.1	22
	7.3	25	7.1	22
	7.1	25	7.1	22
	7.3	25	7.1	22
	7.2	26	7.1	22
	7.1	26	7.1	22
	7.2	25	7.1	22
	7.4	24	7.1	22
	7.2	24	7.1	22
	7.1	24	7.1	22
	7.1	25	7.1	22
	7.1	25	7.1	22
	7.2	25	7.1	22
	7.2	25	7.1	22
October1992	7.2	22	7.1	22
	7.2	23	7.1	22
	7.2	22	7.1	22
	7.2	24	7.1	22
	7.5	23	7.1	22
	7.3	22	7.1	22
	7.3	23	7.2	22
	7.2	23	7.2	22
	7.2	23	7.2	22
	7.1	24	7.2	22
	7.1	23	7.2	22
	7.1	23	7.2	22
	7.2	22	7.2	22
	7.2	23	7.2	22
	7.1	23	7.2	22
	7.3	23	7.2	22
	7.3	23	7.2	22
	7.3	21	7.2	22
	7.4	22	7.2	22
	6.9	22	7.2	22
	7.1	22	7.2	22
	7.3	22	7.2	22
	7.1	23	7.2	22
	7	23	7.2	22
	7.1	23	7.2	22
	7.1	22	7.2	22
	7.1	22	7.2	22
	7.2	22	7.2	22
	7.1	21	7.2	22
	7.1	22	7.2	22
	7.1	23	7.2	22
April1993	7.2	17	7.2	22
	7.2	17	7.2	22
	7	16	7.2	22
	7.2	17	7.2	22
	6.9	17	7.2	22
	7.1	16	7.2	22
	7	18	7.2	22
	7	18	7.2	22
	7.2	18	7.2	22
	7	18	7.2	22
	7	17	7.2	22
	7.1	17	7.2	22
	7	18	7.2	22
	7	18	7.2	22
	6.9	18	7.2	22
	7	19	7.2	22
	6.7	18	7.2	22
	6.8	18	7.2	22
	7.1	20	7.2	22
	7	19	7.2	22
	7.4	20	7.2	22
	7	19	7.2	22
	7.1	18	7.2	22
	6.9	18	7.2	22
	7	18	7.2	22
	7.2	19	7.2	22
	7.3	19	7.2	22
	7.3	19	7.2	22
	7.4	19	7.2	22
	7.4	19	7.2	22

Apr-Oct			pH	Temp
May1993	7.3	19	7.2	22
	7.3	19		22
	7.4	20		22
	7.3	21	7.2	22
	7.3	19	7.2	22
	7.2	21	7.2	22
	7.2	21	7.2	22
	7.3	21	7.2	22
	7.2	21	7.2	22
	7.3	21	7.2	22
	7	21	7.2	22
	7.1	21	7.2	22
	7.4	22	7.2	22
	7.2	22	7.2	22
	7.2	21	7.2	22
	7.3	21	7.2	22
	7.3	22	7.2	22
	7.2	22	7.2	22
	7.2	21	7.2	22
	7.3	21	7.2	22
	7.4	22	7.2	22
	7.2	21	7.2	23
	7.3	22	7.2	23
	7.2	23	7.2	23
	7.4	24	7.2	23
	7.5	23	7.2	23
	7.4	22	7.2	23
	7	22	7.2	23
	7.4	23	7.2	23
	7.4	23	7.2	23
	7.2	22	7.2	23
June1993	7.2	22	7.2	23
	7.3	21	7.2	23
	7.3	21	7.2	23
	7.3	22	7.2	23
	7.1	22	7.2	23
	7.4	22	7.2	23
	7	22	7.2	23
	7.2	23	7.2	23
	7.3	23	7.2	23
	7	23	7.2	23
	7.2	23	7.2	23
	7.4	23	7.2	23
	7.4	23	7.2	23
	7.4	24	7.2	23
	7.4	24	7.2	23
	7	23	7.2	23
	7.1	24	7.2	23
	7.4	24	7.2	23
	7.3	25	7.2	23
	7.2	24	7.2	23
	7	25	7.2	23
	7	25	7.2	23
	7.4	25	7.2	23
	7.2	24	7.2	23
	7.5	24	7.2	23
	7.3	24	7.2	23
	7.4	24	7.2	23
	7.4	24	7.2	23
	7	24	7.2	23
	7.4	24	7.2	23
July1993	7.4	24	7.2	23
	7.6	24	7.2	23
	7.2	25	7.2	23
	7.3	25	7.2	23
	7.4	25	7.2	23
	7.4	25	7.2	23
	7.4	25	7.2	23
	7.4	26	7.2	23
	7.4	26	7.2	23
	7.4	27	7.2	23
	7.4	26	7.2	23
	7.4	26	7.2	23
	7.3	27	7.2	23
	7.3	26	7.2	23
	7.3	26	7.2	23
	7.6	27	7.2	23
	7.4	26	7.2	23
	7.4	26	7.2	23
	7.5	25	7.2	23
	7.5	26	7.2	23
	7.7	26	7.2	23
	7.5	24	7.2	23
	7.5	25	7.2	23
	7.6	25	7.2	23
	7.4	24	7.2	23
	7.7	26	7.2	23
	7.4	26	7.2	23
	7.5	27	7.2	23
	7.6	27	7.2	23
	7.2	26	7.2	23
	7.4	26	7.2	23

Apr-Oct			pH	Temp
August1993	7.6	26	7.2	23
	7.4	26		23
	7.3	26		23
	7.3	26	7.2	23
	7.1	26	7.2	23
	7	24	7.2	23
	7.4	26	7.2	23
	7.3	25	7.2	23
	7.6	25	7.2	23
	7.2	26	7.2	23
	7.1	26	7.2	23
	6.9	25	7.2	23
	7.3	26	7.2	23
	7.5	26	7.2	23
	7.4	25	7.2	23
	7.3	26	7.2	23
	7.3	26	7.2	23
	7	26	7.2	23
	7.3	26	7.2	23
	6.9	26	7.2	23
	7.6	27	7.2	23
	7.4	25	7.2	23
	6.9	26	7.2	23
	7.3	26	7.2	23
	7	26	7.2	23
	7	26	7.2	23
	7.6	27	7.2	23
	7.4	26	7.2	23
	7.3	26	7.2	23
	7.4	25	7.2	23
	7.2	27	7.2	23
September1993	7.4	27	7.2	23
	7.4	27	7.2	23
	7.4	27	7.2	23
	7.4	27	7.2	23
	7.4	27	7.2	23
	7.6	26	7.2	23
	7.4	24	7.2	23
	7.4	27	7.2	23
	7.4	26	7.2	23
	7.4	27	7.2	23
	7.5	25	7.2	23
	7.3	25	7.2	23
	7.5	24	7.2	23
	7.3	26	7.2	23
	7.4	21	7.2	23
	7.2	27	7.2	23
	7.1	26	7.2	23
	7.6	26	7.2	23
	7.4	25	7.2	23
	7.5	25	7.2	23
	7.3	25	7.2	23
	7.4	25	7.2	23
	7.7	24	7.2	23
	7.4	25	7.2	23
	7.4	25	7.2	23
	7.4	24	7.2	23
	7.2	25	7.2	23
	7.5	24	7.2	23
	7.3	23	7.2	23
	7.2	24	7.2	23
October1993	7.4	23	7.2	23
	7.1	23	7.2	23
	7.5	23	7.2	23
	7.5	23	7.2	23
	7.2	23	7.2	23
	7.3	22	7.2	23
	7.6	24	7.2	23
	7.4	23	7.2	23
	7.3	24	7.2	23
	7.2	22	7.2	23
	7	23	7.2	23
	7.2	22	7.2	23
	7.3	23	7.2	23
	7.4	23	7.2	23
	7.3	23	7.2	23
	7.6	23	7.2	23
	7.2	23	7.2	23
	7.4	24	7.2	23
	7.3	23	7.2	23
	7.5	23	7.2	23
	7.4	24	7.2	23
	7.3	22	7.2	23
	7.2	22	7.2	23
	7.4	22	7.2	23
	7.6	22	7.2	23
	7.2	22	7.2	23
	7.5	22	7.2	23
	7.2	23	7.2	23
	7.5	22	7.2	23
	7.3	22	7.2	23

Apr-Oct			pH	Temp
	7.5	21	7.2	23
April1994	7.1	16		23
	7	16		23
	7	16	7.2	23
	7.1	16	7.2	24
	7	17	7.2	24
	6.8	17	7.2	24
	6.8	18	7.2	24
	7	17	7.2	24
	6.9	17	7.2	24
	7	17	7.2	24
	6.9	18	7.2	24
	7.3	16	7.2	24
	7.2	17	7.2	24
	7.2	18	7.2	24
	7.3	19	7.2	24
	7.2	19	7.2	24
	7.3	20	7.2	24
	7.2	18	7.2	24
	7.2	16	7.2	24
	7.1	19	7.2	24
	7.2	19	7.2	24
	7.1	18	7.2	24
	7.2	18	7.2	24
	7.1	18	7.2	24
	7.2	19	7.2	24
	7.1	17	7.2	24
	7	20	7.2	24
	7.2	20	7.2	24
	6.9	17	7.2	24
	7.1	20	7.2	24
May1994	7.2	20	7.2	24
	7.2	20	7.2	24
	7.2	20	7.2	24
	7.2	19	7.2	24
	7.3	19	7.2	24
	7.4	20	7.2	24
	7.1	19	7.2	24
	7.1	20	7.2	24
	7.3	19	7.2	24
	7.4	18	7.2	24
	7.2	19	7.2	24
	7.1	19	7.2	24
	7.4	19	7.2	24
	7.4	18	7.2	24
	7.2	20	7.2	24
	7.3	21	7.2	24
	7.3	21	7.2	24
	7.4	17	7.2	24
	7.2	17	7.2	24
	7.2	18	7.2	24
	7	20	7.2	24
	7.4	20	7.2	24
	7.1	22	7.2	24
	7.1	21	7.2	24
	7.1	23	7.2	24
	7.2	21	7.2	24
	7.4	20	7.2	24
	7.2	20	7.2	24
	7.2	21	7.2	24
	7.2	22	7.2	24
	7.3	22	7.2	24
June1994	7.2	22	7.2	24
	7.3	22	7.2	24
	7.5	21	7.2	24
	7	22	7.2	24
	7.4	22	7.2	24
	7.4	22	7.2	24
	7.3	22	7.2	24
	7.2	22	7.2	24
	7.3	21	7.3	24
	7.3	22	7.3	24
	7.4	22	7.3	24
	7.3	23	7.3	24
	7.1	23	7.3	24
	7.2	21	7.3	24
	7.1	21	7.3	24
	7	22	7.3	24
	7.1	23	7.3	24
	7.1	24	7.3	24
	7.2	23	7.3	24
	7.1	24	7.3	24
	7.1	21	7.3	24
	7.3	22	7.3	24
	7.3	24	7.3	24
	7.1	24	7.3	24
	7.4	25	7.3	24
	7	24	7.3	24
	7.3	24	7.3	24
	7.1	24	7.3	24
	7.2	25	7.3	24
	7.3	23	7.3	24

Apr-Oct			pH	Temp
July1994	7.2	23		24
	7.3	25		24
	7.1	26	[illegible]	24
	6.9	24	7.3	24
	6.9	25	7.3	24
	7	24	7.3	24
	7.1	25	7.3	24
	7.2	26	7.3	24
	7.2	25	7.3	24
	7.1	25	7.3	24
	7	25	7.3	24
	7.3	23	7.3	24
	7.3	24	7.3	24
	7.2	26	7.3	24
	6.7	25	7.3	24
	7.1	26	7.3	24
	7	26	7.3	24
	7.2	26	7.3	24
	7.3	26	7.3	24
	7.2	26	7.3	24
	7	26	7.3	24
	7.4	26	7.3	24
	7.2	26	7.3	24
	7.3	26	7.3	24
	7	26	7.3	24
	7	25	7.3	24
	7.2	25	7.3	24
	6.9	25	7.3	24
	7.2	25	7.3	24
	7.2	26	7.3	24
	7.3	25	7.3	24
August1994	7	26	7.3	24
	7	26	7.3	24
	7.1	26	7.3	24
	7.2	25	7.3	24
	7.2	25	7.3	24
	7.2	24	7.3	24
	7.3	25	7.3	24
	7.2	25	7.3	24
	6.9	22	7.3	24
	7.2	23	7.3	24
	7.3	23	7.3	24
	7.3	25	7.3	24
	7	26	7.3	24
	6.9	25	7.3	24
	7.1	25	7.3	24
	7.1	25	7.3	24
	7.1	25	7.3	24
	7.1	24	7.3	24
	7.1	24	7.3	24
	7.2	25	7.3	24
	7.1	26	7.3	24
	7	25	7.3	24
	7	24	7.3	24
	7.1	24	7.3	24
	7.3	25	7.3	24
	7.2	25	7.3	24
	7.2	26	7.3	24
	7.2	26	7.3	24
	7.1	25	7.3	24
	6.9	24	7.3	24
	7.1	25	7.3	24
September1994	7.1	26	7.3	24
	7.1	24	7.3	24
	7.2	24	7.3	24
	7.3	24	7.3	24
	7.2	24	7.3	24
	7.2	25	7.3	24
	7.2	25	7.3	24
	7.2	24	7.3	24
	7.2	25	7.3	24
	7.2	24	7.3	24
	7.3	24	7.3	24
	7.3	25	7.3	24
	7.2	22	7.3	24
	7.1	25	7.3	24
	7.2	25	7.3	24
	7.2	26	7.3	24
	7	26	7.3	24
	7.3	25	7.3	24
	7.1	25	7.3	24
	7.2	21	7.3	24
	7.2	25	7.3	24
	7.1	25	7.3	24
	7.1	24	7.3	24
	7	24	7.3	24
	7.2	24	7.3	24
	7	24	7.3	24
	7.2	25	7.3	24
	7.1	24	7.3	24
	7	23	7.3	24

Apr-Oct			pH	Temp
	7.2	23	[illegible]	24
October1994	7.2	24		24
	7.1	22	[illegible]	24
	7.2	24	7.3	24
	7.2	24	7.3	24
	7.4	23	7.3	24
	7.4	23	7.3	24
	7.2	23	7.3	25
	7.3	23	7.3	25
	7.5	24	7.3	25
	7.4	24	7.3	25
	7.5	18	7.3	25
	7.4	23	7.3	25
	7.4	23	7.3	25
	7.4	23	7.3	25
	7.2	21	7.3	25
	7.3	22	7.3	25
	7.4	22	7.3	25
	7.4	22	7.3	25
	7.3	22	7.3	25
	7.4	23	7.3	25
	7.4	23	7.3	25
	7.4	23	7.3	25
	7.2	20	7.3	25
	7.3	22	7.3	25
	7.3	22	7.3	25
	7.4	22	7.3	25
	7.4	22	7.3	25
	7.4	22	7.3	25
	7.5	22	7.3	25
	7.2	22	7.3	25
	7	22	7.3	25
April1995	7	18	7.3	25
	7.2	18	7.3	25
	7.3	17	7.3	25
	7.3	18	7.3	25
	7.3	17	7.3	25
	7.4	18	7.3	25
	7.4	18	7.3	25
	7.2	19	7.3	25
	7.2	19	7.3	25
	7.4	19	7.3	25
	7.3	20	7.3	25
	7	18	7.3	25
	7.3	19	7.3	25
	7.1	18	7.3	25
	7.4	18	7.3	25
	7.4	18	7.3	25
	7.4	18	7.3	25
	7.5	18	7.3	25
	7.5	20	7.3	25
	7.5	19	7.3	25
	7.5	19	7.3	25
	7.2	20	7.3	25
	7.5	19	7.3	25
	7.4	18	7.3	25
	7.5	18	7.3	25
	7.5	19	7.3	25
	7.4	19	7.3	25
	7.4	19	7.3	25
	7.4	19	7.3	25
	7.5	18	7.3	25
May1995	7.4	19	7.3	25
	7.5	19	7.3	25
	7.5	18	7.3	25
	7.4	19	7.3	25
	7.4	19	7.3	25
	7.5	19	7.3	25
	7.5	19	7.3	25
	7.4	19	7.3	25
	7.4	20	7.3	25
	7.5	19	7.3	25
	7.4	19	7.3	25
	7.4	20	7.3	25
	7.4	19	7.3	25
	7.4	19	7.3	25
	7.4	20	7.3	25
	7.3	20	7.3	25
	7.3	20	7.3	25
	7.3	20	7.3	25
	7.3	21	7.3	25
	7.3	20	7.3	25
	7.2	20	7.3	25
	7.3	21	7.3	25
	7.2	21	7.3	25
	7.2	21	7.3	25
	7.1	22	7.3	25
	7.2	21	7.3	25
	7.2	21	7.3	25
	7.3	20	7.3	25
	7.2	19	7.3	25
	7.2	22	7.3	25

Apr-Oct			pH	Temp
	7.3	21		25
June1995	7.1	21		25
	7.2	23	7.3	25
	7.2	22	7.3	25
	7	22	7.3	25
	7.2	21	7.3	25
	7.2	22	7.3	25
	7.2	23	7.3	25
	7.3	23	7.3	25
	7.3	22	7.3	25
	7.3	22	7.3	25
	7.3	23	7.3	25
	7.3	23	7.3	25
	7.2	23	7.3	25
	7.3	22	7.3	25
	7.2	22	7.3	25
	7.4	22	7.3	25
	7.2	23	7.3	25
	7.2	24	7.3	25
	7.2	23	7.3	25
	7.2	23	7.3	25
	7.2	25	7.3	25
	7.3	23	7.3	25
	7.3	23	7.3	25
	7	22	7.3	25
	7.3	22	7.3	25
	7.2	26	7.3	25
	7.3	23	7.3	25
	7.2	22	7.3	25
	7.3	22	7.3	25
	7.2	23	7.3	25
July1995	7.2	24	7.3	25
	7.3	24	7.3	25
	7.4	24	7.3	25
	7.2	24	7.3	25
	7.5	25	7.3	25
	7.2	25	7.3	25
	7.2	25	7.3	25
	7.2	24	7.3	25
	7.3	24	7.3	25
	7.2	25	7.3	25
	7.3	26	7.4	25
	7.3	25	7.4	25
	7.2	25	7.4	25
	7.2	25	7.4	25
	7.3	25	7.4	25
	7.2	25	7.4	25
	7.2	25	7.4	25
	7.3	26	7.4	25
	7.3	26	7.4	25
	7.2	25	7.4	25
	7.2	26	7.4	25
	7.3	26	7.4	25
	7.3	26	7.4	25
	7.3	26	7.4	25
	7.3	26	7.4	25
	7.3	27	7.4	25
	7.3	27	7.4	25
	7.4	26	7.4	25
	7.3	27	7.4	25
	7.3	26	7.4	25
	7.4	27	7.4	25
August1995	7.3	26	7.4	25
	7.3	26	7.4	25
	7.3	27	7.4	25
	7.4	27	7.4	25
	7.3	27	7.4	25
	7.3	26	7.4	25
	7.4	26	7.4	25
	7.4	26	7.4	25
	7.4	25	7.4	25
	7.4	26	7.4	25
	7.4	26	7.4	25
	7.4	25	7.4	25
	7.3	26	7.4	25
	7.3	26	7.4	25
	7.4	26	7.4	25
	7.3	26	7.4	25
	7.4	27	7.4	25
	7.4	27	7.4	25
	7.4	26	7.4	25
	7.3	26	7.4	25
	7.4	25	7.4	25
	7.4	25	7.4	25
	7.4	26	7.4	25
	7.3	25	7.4	25
	7.3	25	7.4	25
	7.3	24	7.4	25
	7.4	25	7.4	25
	7.4	25	7.4	25
	7.3	25	7.4	25
	7.4	25	7.4	25

Month	pH (S.U.)	Temperature (C)	Ranking	
Apr-Oct			pH	Temp
	7.3	25		25
Sep1995	7.4	26		25
	7.5	27	[illegible]	25
	7.5	26	7.4	25
	7.4	25	7.4	25
	7.2	26	7.4	25
	7.2	26	7.4	25
	7.3	27	7.4	25
	7.3	27	7.4	25
	7.5	29	7.4	25
	7.3	27	7.4	25
	7.3	25	7.4	25
	7.2	24	7.4	25
	7.3	24	7.4	25
	7.3	26	7.4	25
	7.4	27	7.4	25
	7.2	25	7.4	25
	7.3	24	7.4	25
	7.2	26	7.4	25
	7.4	25	7.4	25
	7.4	25	7.4	25
	7.3	26	7.4	25
	7.3	26	7.4	25
	7.3	23	7.4	25
	7.2	24	7.4	25
	7.3	24	7.4	25
	7.3	24	7.4	25
	7.3	24	7.4	25
	7.3	24	7.4	25
	7.4	25	7.4	25
	7.4	25	7.4	25
Oct1995	7.3	24	7.4	25
	7.3	24	7.4	25
	7.3	25	7.4	25
	7.2	25	7.4	25
	7.3	25	7.4	25
	7.3	24	7.4	25
	7.4	25	7.4	25
	7.3	25	7.4	25
	7.4	25	7.4	25
	7.2	24	7.4	25
	7.2	24	7.4	25
	7.3	25	7.4	25
	7.3	24	7.4	25
	7.3	25	7.4	25
	7.5	24	7.4	25
	7.2	23	7.4	25
	7.2	23	7.4	25
	7.2	23	7.4	25
	7.1	23	7.4	25
	7.2	24	7.4	25
	7.1	22	7.4	26
	7.2	21	7.4	26
	7	23	7.4	26
	7.2	23	7.4	26
	7.3	23	7.4	26
	7.1	23	7.4	26
	7.1	23	7.4	26
	7.2	22	7.4	26
	7.2	22	7.4	26
	7.2	23	7.4	26
	7.2	23	7.4	26
April1996	7.1	17	7.4	26
	7	16	7.4	26
	7	17	7.4	26
	7	18	7.4	26
	7.2	17	7.4	26
	7.2	17	7.4	26
	6.9	17	7.4	26
	7	17	7.4	26
	7.2	17	7.4	26
	7	16	7.4	26
	7	18	7.4	26
	7.6	17	7.4	26
	7	19	7.4	26
	7.1	20	7.4	26
	7	19	7.4	26
	7.1	18	7.4	26
	7.1	17	7.4	26
	7.2	18	7.4	26
	7.1	19	7.4	26
	7.3	19	7.4	26
	7.1	20	7.4	26
	7.1	19	7.4	26
	7.1	20	7.4	26
	7.1	19	7.4	26
	7.2	19	7.4	26
	7.2	20	7.4	26
	7.2	20	7.4	26
	7	20	7.4	26
	7.2	19	7.4	26
	7.1	20	7.4	26

Month	pH (S.U.)	Temperature (C)	Ranking		
Apr-Oct			pH	Temp	
May1996	7	20		26	
	7.1	20		26	
	7.1	20	7.4	26	
	7.2	20	7.4	26	
	7	21	7.4	26	
	7.1	20	7.4	26	
	7.2	20	7.4	26	
	7	19	7.4	26	
	7	20	7.4	26	
	7.1	19	7.4	26	
	7.2	22	7.4	26	
	7.2	21	7.4	26	
	7.1	19	7.4	26	
	7.1	19	7.4	26	
	7.2	20	7.4	26	
	7.1	20	7.4	26	
	7.2	20	7.4	26	
	7.1	20	7.4	26	
	7.3	22	7.4	26	
	7	21	7.4	26	
	7.1	22	7.4	26	
	7.1	21	7.4	26	
	7.2	21	7.4	26	
	7.1	22	7.4	26	
	7.2	21	7.4	26	
	7.2	20	7.4	26	
	7.4	20	7.4	26	
	7	20	7.4	26	
	7.1	20	7.4	26	
	7.3	20	7.4	26	
	7	23	7.4	26	
June1996	7.1	21	7.4	26	
	6.7	21	7.4	26	
	7	21	7.4	26	
	7.1	21	7.4	26	
	7.1	22	7.4	26	
	7.2	22	7.4	26	
	7.2	22	7.4	26	
	7	23	7.4	26	
	7	23	7.4	26	
	7	22	7.4	26	
	7.2	22	7.4	26	
	7.1	22	7.4	26	
	7.1	23	7.4	26	
	7	24	7.4	26	
	7.2	24	7.4	26	
	7.1	23	7.4	26	
	7.3	23	7.4	26	
	7.1	23	7.4	26	
	6.8	23	7.4	26	
	6.9	24	7.4	26	
	7	23	7.4	26	
	6.8	24	7.4	26	
	6.9	24	7.4	26	
	7.2	24	7.4	26	
	7	24	7.4	26	
	7	23	*7.4	*26	Apr - Oct 90th Percentiles
	7.2	23	7.4	26	
	7.4	24	7.4	26	
	7.4	24	7.4	26	
	7	24	7.4	26	
July1996	7.4	24	7.4	26	
	7.4	25	7.4	26	
	7.2	24	7.4	26	
	7.3	24	7.4	26	
	7.3	24	7.4	26	
	7.2	24	7.4	26	
	7.1	25	7.4	26	
	7.5	25	7.4	26	
	7.3	25	7.4	26	
	7.1	24	7.4	26	
	7.3	25	7.4	26	
	7.4	24	7.4	26	
	7.3	24	7.4	26	
	7.3	25	7.4	26	
	7.3	25	7.4	26	
	7.3	24	7.4	26	
	7.3	25	7.4	26	
	7.3	25	7.4	26	
	7.2	24	7.4	26	
	7.2	23	7.4	26	
	6.8	24	7.4	26	
	7.4	24	7.5	26	
	7.4	24	7.5	26	
	7.3	24	7.5	26	
	7.3	24	7.5	26	
	7.2	24	7.5	26	
	7.3	24	7.5	26	
	7.3	25	7.5	26	
	7.4	24	7.5	26	
	7.4	24	7.5	26	
	7.3	25	7.5	26	

Month Apr-Oct	pH (S.U.)	Temperature (C)	Ranking pH	Temp
August1996	7.3	25		26
	7.3	24		26
	7.2	25	...	26
	7.4	25	7.5	26
	7.2	25	7.5	26
	7.4	26	7.5	26
	7.3	25	7.5	26
	7.4	25	7.5	26
	7.4	26	7.5	26
	7.4	26	7.5	26
	7.5	25	7.5	26
	7.2	24	7.5	26
	7	25	7.5	26
	7	24	7.5	26
	7.4	25	7.5	26
	7.4	25	7.5	26
	7.4	24	7.5	26
	7.1	24	7.5	26
	7.2	25	7.5	26
	7.2	25	7.5	26
	7.3	25	7.5	26
	7.2	25	7.5	26
	7.2	26	7.5	26
	7.5	25	7.5	26
	7.3	25	7.5	26
	7	26	7.5	26
	7.2	26	7.5	26
	7.2	26	7.5	26
	6.9	26	7.5	26
	7.3	25	7.5	26
	7.4	25	7.5	26
Sep1996	7.3	25	7.5	26
	7.4	25	7.5	26
	7.1	25	7.5	26
	7.2	25	7.5	26
	7	25	7.5	26
	7.2	25	7.5	26
	7	24	7.5	26
	7.1	25	7.5	26
	7.1	25	7.5	26
	7	25	7.5	26
	7.1	26	7.5	26
	7	25	7.5	26
	7.2	25	7.5	26
	7.2	25	7.5	26
	7.3	24	7.5	27
	7.2	25	7.5	27
	7.1	25	7.5	27
	7.2	24	7.5	27
	7.4	24	7.5	27
	7.4	25	7.5	27
	7.2	24	7.5	27
	7.2	23	7.5	27
	7.1	24	7.5	27
	7.3	24	7.5	27
	7.2	23	7.5	27
	7.2	24	7.5	27
	7.2	24	7.5	27
	7.1	24	7.5	27
	7.3	23	7.5	27
	7.2	23	7.5	27
October1996	7.1	24	7.5	27
	7.1	24	7.5	27
	7.2	24	7.5	27
	7.1	23	7.5	27
	7	22	7.6	27
	7	22	7.6	27
	7.1	22	7.6	27
	6.9	23	7.6	27
	6.7	22	7.6	27
	7.1	23	7.6	27
	7.2	22	7.6	27
	7.1	23	7.6	27
	7	22	7.6	27
	7.2	23	7.6	27
	7.1	23	7.6	27
	7.2	22	7.6	27
	7.1	23	7.6	27
	7.2	23	7.6	27
	7.2	21	7.6	27
	7	21	7.6	27
	6.9	22	7.6	27
	7	22	7.6	27
	7.1	23	7.6	27
	7	22	7.6	27
	7.2	23	7.6	27
	7.1	25	7.6	28
	7	22	7.7	28
	7	23	7.7	29
	7.1	22	7.7	29
	7.2	22	7.8	29
	7.2	22	7.9	30

90th Percentile Values
April-October
N=1284
$(1284 \times 90) \div 100 = 1155.6$
or
1156th
Value

1998

Analysis of the LP Apr.-OCT 67 MGD effluent data or Ammonia as Nitrogen

The statistics for Ammonia as Nitrogen are:

Number of values	=	1
Quantification level	=	.2
Number < quantification	=	0
Expected value	=	10
Variance	=	36.00001
C.V.	=	.6
97th percentile	=	24.33418
Statistics used	=	Reasonable potential assumptions - Type 2 data

The WLAs for Ammonia as Nitrogen are:

Acute WLA	=	13.46✓
Chronic WLA	=	2.06✓
Human Health WLA	=	----

The limits are based on chronic toxicity and 30 samples/month.

Maximum daily limit	=	4.156401 = 4.2
Average weekly limit	=	2.507276 = 2.5 mg/l
Average monthly limit	=	2.06 = 2.1

Note: The maximum daily limit applies to industrial dischargers
The average weekly limit applies to domestic discharges
The average monthly limit applies to both.

The Data are
10

The Policy for the Potomac River Embayments Ammonia limit April-October is 1.0 mg/l monthly average. 1.0 mg/l is more stringent than the WQ-based value of 2.1 mg/l and will be imposed in the permit

Conclusion: 1 mg/l x 67 MGD x 3.785 = 254 Kg/d monthly average

The Policy for the Potomac River Embayments limit for Ammonia is 1 mg/l. The routine multiplier - 1.5 - is used to calculate the weekly average limit of 1.5 mg/l. 1.5 mg/l is more stringent than 2.5 mg/l and will be imposed in the permit.

Conclusion: 1.5 mg/l x 67 MGD x 3.785 = 380 Kg/d weekly avg max

FACILITY: Lower Potomac
VPDES #: 25364

Ammonia Calculation - Acute Ammonia Criteria for Freshwater

	Temperature	pH		TIER INFORMATION:	Nov-Mar
DATA ENTRY:->	21	7.40	90th Percentiles		

FT
FT=10^((.03)(20-T) = 0.9332543

FPH
FPH=1 if 8.0<=pH<=9.0 = NA
FPH=((1+10^(7.4-pH))/1.25 if 6.5<=pH<8.0 = 1.6000000
FPH= **1.6**

Acute Criteria Concentration=.52/FT/FPH/2 = **0.1741219**

Conversion from un-ionized to Total Ammonia can be calculated by using the following formulas:
Total Acute Ammonia Criteria = Calculated un-ionized ammonia criteria divided by fraction of un-ionized Ammonia
Where: Fraction of un-ionized ammonia = 1/(10^(pKa-pH) +1) **Fraction= 0.0106183**
where: pKa = 0.09018 + (2729.92/273.2 + temperature 'C,) **pKa = 9.3693098**
Total Acute Ammonia Criteria = Calculated un-ionized Ammonia Criteria divided by fraction of un-ionized Ammonia
Total Acute Ammonia Criteria = **0.1741219** / **0.0106182767** = Total Ammonia = **16.3983188 mg/l**

Total Ammonia is then converted to Ammonia-Nitrogen.
TOTAL ACUTE N-NH3 16.3983188 X .824 13.5122147 MG/L = 13.51

Ammonia Calculation - Chronic Ammonia Criteria for Freshwater

	Temperature	pH	TIER INFORMATION:	NOv-Mar
DATA ENTRY:->	21	7.40		

FT
FT=10^((.03)(20-T) = 0.9332543

FPH
FPH=1 if 8.0<=pH<=9.0 = NA
FPH=((1+10^(7.4-pH))/1.25 if 6.5<=pH<8.0 = 1.6000000
FPH= **1.6**

Ratio
Ratio = 13.5 if 7.7<=pH<=9.0 = NA
Ratio = 20.25 x (10^(7.7-pH))/(1+(10^(7.4-pH)) if 6.5<=pH<7.7 = 20.2020309
Ratio = **20.202031**

Chronic Criteria Concentration=.8/FT/FPH/RATIO = **0.0265201**

Conversion from un-ionized to Total Ammonia can be calculated by using the following formulas:
Total Acute Ammonia Criteria = Calculated un-ionized ammonia criteria divided by fraction of un-ionized Ammonia
Where: Fraction of un-ionized ammonia = 1/(10^(pKa-pH) +1) **Fraction= 0.0106183**
where: pKa = 0.09018 + (2729.92/273.2 + temperature 'C) **pKa = 9.3693098**
Total Acute Ammonia Criteria=Calculated un-ionized Ammonia Criteria divided by fraction of un-ionized Ammonia
Total Acute Ammonia Criteria = **0.0265201** / **0.0106183** = Total Ammonia = **2.49758877 mg/l**

Total Ammonia is then converted to Ammonia-Nitrogen.
TOTAL CHRONIC N-NH3 2.4975888 X .824 2.0580131 MG/L = 2.06

Revised 12/03/97: (i:wdbr1\common\permits\model\newamm)

January1991	7.1	16		11
	7.5	18		12
	7.3	18	[illegible]	12
	7.2	18	6.4	13
	7.3	17	6.5	13
	7.2	18	6.5	13
	7.3	18	6.5	13
	7.2	17	6.5	13
	7.3	18	6.5	13
	7.3	18	6.6	13
	7.3	18	6.6	13
	6.9	16	6.6	13
	7.3	18	6.6	13
	7	17	6.6	13
	7.1	17	6.7	14
	7.1	18	6.7	14
	7.3	18	6.7	14
	7.4	17	6.7	14
	7.3	17	6.7	14
	7	18	6.7	14
	7.3	18	6.7	14
	7.3	17	6.7	14
	7.2	17	6.8	14
	7.3	16	6.8	14
	7.3	16	6.8	14
	7.3	15	6.8	14
	7.4	17	6.8	14
	7.3	17	6.8	14
	7.4	17	6.8	14
	7.3	18	6.8	14
	7.3	18	6.8	14
February1991	7.5	17	6.8	14
	7.3	17	6.8	14
	7.3	18	6.8	14
	7.4	18	6.8	14
	7.4	18	6.9	14
	7.3	18	6.9	14
	7.3	18	6.9	14
	7.3	18	6.9	14
	7.4	16	6.9	14
	7.4	19	6.9	14
	7.3	17	6.9	14
	7.4	17	6.9	14
	7.4	16	6.9	14
	7.3	17	6.9	14
	7.4	17	6.9	14
	7.1	14	6.9	14
	7.2	16	6.9	14
	7.2	16	6.9	14
	6.8	17	6.9	14
	7.1	17	6.9	14
	7.2	18	6.9	14
	7.1	17	6.9	14
	7.1	17	6.9	14
	7.3	19	6.9	15
	7.1	17	6.9	15
	7.2	16	6.9	15
	7	16	6.9	15
	7	17	6.9	15
March1991	7	17	6.9	15
	6.9	18	6.9	15
	7.4	18	6.9	15
	7.1	18	6.9	15
	7.2	17	6.9	15
	7.1	18	6.9	15
	7.2	17	6.9	15
	7	17	6.9	15
	7.3	18	6.9	15
	7.4	19	6.9	15
	7.2	18	6.9	15
	7.2	18	6.9	15
	7.2	18	6.9	15
	7.2	18	6.9	15
	7.2	18	6.9	15
	7.2	18	6.9	15
	7.2	18	6.9	15
	7.1	18	6.9	15
	7	17	6.9	15
	7.1	18	6.9	15
	7.1	17	6.9	15
	7.2	18	6.9	15
	7.1	18	6.9	15
	7.3	19	6.9	15
	7.3	17	6.9	15
	7.2	17	7	15
	7.5	18	7	15
	7.3	19	7	15
	6.9	19	7	15
	7.3	16	7	15
	7.4	18	7	15
November1991	7.3	23	7	15
	7.3	24	7	15

	7.3	22		15
	7.3	15		15
	7.4	21	.	15
	7.4	21	7	15
	7.3	21	7	15
	7.3	22	7	15
	7.3	20	7	15
	7.1	21	7	15
	7.3	22	7	15
	7.3	21	7	15
	7.4	20	7	15
	7.3	21	7	15
	7.4	22	7	15
	7.4	24	7	15
	7.3	21	7	15
	7.4	21	7	15
	7.4	22	7	15
	7.4	23	7	15
	7.3	23	7	15
	7.2	23	7	15
	7.3	22	7	15
	7.3	22	7	15
	7.3	20	7	15
	7.4	20	7	15
	7.4	20	7	15
	7.3	20	7	15
	7.3	22	7	15
	7.3	22	7	15
December1991	7.2	21	7	15
	7.2	22	7	15
	7.2	20	7	15
	7.2	20	7	15
	7.3	16	7	15
	7.3	19	7	15
	7.4	19	7	15
	7.3	19	7	15
	7.4	21	7	15
	7.1	19	7	15
	7.2	18	7	15
	7.3	18	7	15
	7.1	19	7	15
	7.3	19	7	15
	7.2	19	7	15
	7.4	19	7	15
	7.3	18	7	15
	7.1	18	7	15
	7.1	17	7	15
	7.1	14	7	15
	7	18	7	15
	7.2	19	7	15
	7.2	18	7	15
	7.2	18	7	15
	7.2	18	7	15
	7.2	18	7	15
	7.4	18	7	15
	7	19	7	15
	7.1	18	7	15
	7.1	18	7	16
	7.2	17	7	16
January1992	7.1	18	7	16
	7.1	19	7	16
	7	19	7	16
	6.9	18	7	16
	6.8	18	7	16
	6.9	16	7	16
	7.2	17	7	16
	7.4	17	7	16
	7.3	18	7	16
	7.1	19	7	16
	7	18	7	16
	7.6	19	7	16
	7.1	19	7	16
	7.2	19	7	16
	7.2	18	7	16
	7.1	19	7	16
	7.2	17	7	16
	7.2	16	7	16
	6.9	16	7	16
	7	17	7	16
	7.3	18	7	16
	7.1	18	7	16
	7.3	18	7	16
	7.1	18	7	16
	7.2	17	7	16
	7.4	18	7	16
	7.2	18	7	16
	7.3	18	7	16
	7	17	7	16
	7.1	17	7	16
	7.3	18	7	16
February1992	7.1	18	7	16
	7.1	16	7	16

	7.2	17		16
	7.2	17		16
	7.2	17		16
	7.2	17	7	16
	7.2	17	7	16
	7	14	7	16
	7	16	7	16
	7.3	16	7	16
	7	17	7	16
	7.1	14	7	16
	7.1	17	7	16
	7.1	18	7	16
	7.1	18	7	16
	7.2	18	7	16
	7.2	18	7	16
	7.1	18	7	16
	7.2	17	7	16
	7	18	7	16
	7.1	18	7	16
	7.1	19	7	16
	7.1	18	7	16
	7.1	18	7	16
	7.1	16	7	16
	6.8	18	7	16
	7.4	17	7	16
	7	18	7	16
	6.9	18	7	16
March1992	6.9	17	7	16
	6.9	18	7	16
	7.4	18	7	16
	7.1	18	7	16
	7	19	7	16
	6.9	18	7	16
	7.1	18	7	16
	6.7	18	7	16
	6.8	19	7	16
	6.9	17	7	16
	6.8	18	7	16
	7	17	7	16
	7	17	7	16
	7	17	7	16
	6.5	18	7	16
	7	17	7	16
	7	21	7	16
	7.1	17	7.1	16
	7	17	7.1	16
	7.1	16	7.1	16
	6.7	17	7.1	16
	7.1	17	7.1	16
	6.5	17	7.1	16
	7	17	7.1	16
	6.9	17	7.1	16
	7	18	7.1	16
	6.4	17	7.1	16
	6.5	17	7.1	16
	6.5	18	7.1	16
	6.7	19	7.1	16
	7	18	7.1	16
November1992	7.4	21	7.1	16
	7.3	22	7.1	16
	6.9	22	7.1	16
	6.9	22	7.1	16
	7	22	7.1	16
	7	22	7.1	16
	7.2	20	7.1	16
	7	21	7.1	16
	7	20	7.1	16
	6.6	20	7.1	16
	7	20	7.1	16
	6.9	21	7.1	16
	7	21	7.1	16
	7	20	7.1	16
	7.2	20	7.1	16
	7.1	19	7.1	16
	7	19	7.1	16
	7.1	21	7.1	16
	7.2	20	7.1	16
	7.2	19	7.1	16
	6.9	21	7.1	16
	7	21	7.1	16
	6.8	21	7.1	16
	7.1	20	7.1	16
	6.9	20	7.1	16
	7	20	7.1	16
	7.3	20	7.1	16
	7.2	20	7.1	16
	6.9	19	7.1	16
	7.1	19	7.1	16
December1992	6.9	19	7.1	16
	7.2	19	7.1	16
	7	18	7.1	16
	7.2	19	7.1	16

	7.1	19	[illegible]	16
	7	18		16
	7.1	19	[illegible]	16
	7.2	15	7.1	16
	7.2	18	7.1	16
	7.1	18	7.1	16
	7.2	18	7.1	16
	6.9	16	7.1	16
	6.6	18	7.1	16
	7	18	7.1	16
	7	18	7.1	17
	7	18	7.1	17
	6.9	19	7.1	17
	7	19	7.1	17
	7.1	19	7.1	17
	7	19	7.1	17
	7	18	7.1	17
	7	18	7.1	17
	7.2	18	7.1	17
	7.1	17	7.1	17
	7	17	7.1	17
	7.1	19	7.1	17
	7	17	7.1	17
	7	17	7.1	17
	7.1	17	7.1	17
	7	17	7.1	17
	7	18	7.1	17
January1993	7	18	7.1	17
	6.9	17	7.1	17
	7	17	7.1	17
	7.1	18	7.1	17
	7.1	19	7.1	17
	7.1	18	7.1	17
	6.9	18	7.1	17
	6.9	18	7.1	17
	7	18	7.1	17
	6.9	18	7.1	17
	6.7	18	7.1	17
	7.2	17	7.1	17
	7	18	7.1	17
	7.1		7.1	17
	6.7		7.1	17
	7		7.1	17
	7		7.1	17
	6.8		7.1	17
	7		7.1	17
	7.1		7.1	17
	7		7.1	17
	7		7.1	17
	6.9		7.1	17
	6.9		7.1	17
	6.8		7.1	17
	6.9		7.1	17
	7		7.1	17
	7.2		7.1	17
	7.1		7.1	17
	7.1		7.1	17
	7		7.1	17
February1993	7.1	17	7.1	17
	7	17	7.1	17
	7.2	17	7.1	17
	7.2	16	7.1	17
	7	17	7.1	17
	7.2	17	7.1	17
	7.1	17	7.1	17
	7	17	7.1	17
	7.3	17	7.1	17
	7.3	17	7.1	17
	7.3	17	7.1	17
	7.2	17	7.1	17
	7	17	7.1	17
	7	16	7.1	17
	7.2	16	7.1	17
	7.2	16	7.1	17
	7.2	16	7.1	17
	7.3	16	7.1	17
	7.3	16	7.1	17
	7.3	16	7.1	17
	7.2	16	7.1	17
	7.1	17	7.1	17
	7	16	7.1	17
	7.1	15	7.1	17
	7.2	15	7.1	17
	7.1	16	7.1	17
	7.1	16	7.1	17
	7.2	16	7.1	17
March1993	7.2	15	7.1	17
	7.2	15	7.1	17
	7.3	17	7.1	17
	7	16	7.1	17
	6.7	15	7.1	17
	6.9	15	7.1	17

	6.8	15	[illegible]	17
	7.2	16		17
	7.4	16	[illegible]	17
	7	16	7.1	17
	7	16	7.1	17
	6.9	16	7.1	17
	7	16	7.1	17
	6.7	14	7.1	17
	6.9	15	7.1	17
	6.9	15	7.1	17
	6.8	16	7.1	17
	6.8	14	7.1	17
	7.1	15	7.1	17
	6.9	15	7.1	17
	7.2	16	7.2	17
	6.9	16	7.2	17
	7	17	7.2	17
	7	16	7.2	17
	7	16	7.2	17
	6.9	16	7.2	17
	7.1	17	7.2	17
	7.1	17	7.2	17
	6.9	16	7.2	17
	7.2	16	7.2	17
	6.9	17	7.2	17
November1993	7.5	22	7.2	17
	7.5	20	7.2	17
	7.6	20	7.2	17
	7.6	21	7.2	17
	7.5	23	7.2	17
	7.5	21	7.2	17
	7.6	21	7.2	17
	7.6	21	7.2	17
	7.6	20	7.2	17
	7.6	21	7.2	17
	7.6	21	7.2	17
	7.3	21	7.2	17
	7.6	21	7.2	17
	7.5	22	7.2	17
	7.5	22	7.2	17
	7.6	22	7.2	17
	7.6	21	7.2	17
	7.5	20	7.2	17
	7.6	21	7.2	17
	7.5	19	7.2	17
	7.6	19	7.2	17
	7.5	20	7.2	17
	7.3	21	7.2	17
	7.6	19	7.2	17
	7.4	20	7.2	17
	7.4	19	7.2	17
	7.6	20	7.2	17
	7.2	19	7.2	17
	7.3	18	7.2	17
	7.1	19	7.2	17
December1993	7.1	19	7.2	17
	7	19	7.2	17
	7.3	19	7.2	17
	7.2	19	7.2	17
	7.1	19	7.2	17
	7.1	19	7.2	17
	7	19	7.2	17
	7.2	20	7.2	17
	7	19	7.2	17
	7.1	20	7.2	17
	7.5	19	7.2	17
	7.3	16	7.2	17
	7	18	7.2	17
	7.4	18	7.2	17
	7.3	19	7.2	17
	7.1	18	7.2	17
	7.2	17	7.2	17
	7.2	17	7.2	17
	7.3	19	7.2	17
	7.4	19	7.2	17
	7.1	18	7.2	17
	7	20	7.2	17
	7.1	19	7.2	17
	7.3	18	7.2	17
	7.2	18	7.2	17
	7.3	17	7.2	17
	7.2	17	7.2	17
	7.3	17	7.2	17
	7.1	12	7.2	17
	7.4	16	7.2	17
	6.8	16	7.2	17
Jan1994	7.3	18	7.2	17
	7.2	17	7.2	17
	7	17	7.2	17
	7	17	7.2	17
	7.2	15	7.2	17
	7.2	17	7.2	17

	7.3	17	[illegible]	17
	7.2	18	[illegible]	17
	7	16	[illegible]	17
	7.4	15	7.2	18
	7.3	14	7.2	18
	7	15	7.2	18
	7	15	7.2	18
	7	15	7.2	18
	7.1	14	7.2	18
	7.1	11	7.2	18
	7.2	14	7.2	18
	7.2	14	7.2	18
	7.1	13	7.2	18
	7.3	13	7.2	18
	6.9	13	7.2	18
	7.1	15	7.2	18
	7.2	15	7.2	18
	7	14	7.2	18
	7.3	17	7.2	18
	6.9	16	7.2	18
	7	15	7.2	18
	7.2	14	7.2	18
	7	15	7.2	18
	7	15	7.2	18
	7.2	15	7.2	18
Feb1994	7.2	16	7.2	18
	7.1	15	7.2	18
	7.5	15	7.2	18
	7.3	15	7.2	18
	7.2	15	7.2	18
	7.3	15	7.2	18
	7.1	16	7.2	18
	7.3	16	7.2	18
	7.4	15	7.2	18
	7	13	7.2	18
	7.6	12	7.2	18
	7.4	15	7.2	18
	7.3	17	7.2	18
	7.3	15	7.2	18
	7.3	15	7.2	18
	7.2	15	7.2	18
	7.2	15	7.2	18
	7.1	15	7.2	18
	7.1	15	7.2	18
	7	16	7.2	18
	7	16	7.2	18
	7.2	15	7.2	18
	7.2	14	7.2	18
	7	14	7.2	18
	7.3	13	7.2	18
	7	16	7.2	18
	7.1	13	7.2	18
	7.2	14	7.2	18
Mar1994	6.9	14	7.2	18
	7	15	7.2	18
	7	13	7.2	18
	7.3	13	7.2	18
	7.1	14	7.2	18
	7.3	15	7.2	18
	7.2	15	7.2	18
	7.4	14	7.2	18
	7.4	15	7.2	18
	7.1	15	7.2	18
	6.9	14	7.2	18
	7	15	7.2	18
	7.2	15	7.2	18
	7.2	15	7.2	18
	7.4	14	7.2	18
	7.1	15	7.2	18
	7	14	7.2	18
	7	16	7.2	18
	6.9	16	7.2	18
	7.2	16	7.2	18
	7.2	16	7.2	18
	7.2	16	7.2	18
	7.1	16	7.2	18
	7	17	7.2	18
	7.1	18	7.2	18
	7	16	7.2	18
	7.1	16	7.2	18
	7	16	7.2	18
	7	15	7.2	18
	7.2	15	7.2	18
	7	15	7.2	18
November1994	7.4	23	7.2	18
	7.4	22	7.2	18
	7.3	21	7.2	18
	7.3	22	7.2	18
	7.4	22	7.2	18
	7.3	23	7.2	18
	7.3	22	7.2	18
	7.2	23	7.2	18

	7.2	22	[illegible]	18
	7.3	22	[illegible]	18
	7	21	[illegible]	18
	7.3	21	7.2	18
	7.2	22	7.2	18
	7.3	23	7.2	18
	7.2	22	7.2	18
	7.2	22	7.2	18
	7.2	21	7.2	18
	7.3	21	7.2	18
	7.1	21	7.2	18
	7.1	21	7.2	18
	7	21	7.2	18
	7	22	7.2	18
	7.1	20	7.2	18
	7.1	20	7.2	18
	7	19	7.2	18
	7	19	7.2	18
	7.2	20	7.2	18
	7.2	20	7.2	18
	7.1	21	7.2	18
	7.2	21	7.2	18
Dec1994	7.1	20	7.2	18
	7.1	21	7.2	18
	7.2	20	7.2	18
	7.2	20	7.2	18
	7.1	21	7.2	18
	7.1	22	7.2	18
	7.2	21	7.2	18
	7.2	20	7.2	18
	7.2	19	7.2	18
	7.2	19	7.2	18
	7.1	18	7.2	18
	7.1	18	7.2	18
	7	19	7.2	18
	7.1	19	7.2	18
	7.3	20	7.2	18
	7.4	19	7.2	18
	7.3	19	7.2	18
	7.2	19	7.2	18
	7.2	19	7.2	18
	7.1	19	7.2	18
	7.1	18	7.2	18
	7.3	18	7.2	18
	7.3	18	7.2	18
	7	18	7.3	18
	7.3	18	7.3	18
	7.3	19	7.3	18
	7.4	18	7.3	18
	7.3	19	7.3	18
	7.3	19	7.3	18
	7.2	15	7.3	18
	7.4	18	7.3	18
Jan1995	6.9	18	7.3	18
	7	18	7.3	18
	7.3	18	7.3	18
	7.4	18	7.3	18
	7.4	17	7.3	18
	7.4	17	7.3	18
	7.4	17	7.3	18
	7.2	16	7.3	18
	7.3	17	7.3	18
	7.1	17	7.3	18
	7.3	17	7.3	18
	7.2	17	7.3	18
	7.2	18	7.3	18
	7.3	19	7.3	18
	7.1	19	7.3	18
	7	18	7.3	18
	7.3	17	7.3	18
	7.4	18	7.3	18
	7.3	17	7.3	18
	7.1	17	7.3	18
	7.1	16	7.3	18
	7.3	16	7.3	18
	7.2	16	7.3	18
	7.1	16	7.3	18
	7.2	15	7.3	18
	7.3	16	7.3	18
	7.2	15	7.3	18
	7.2	15	7.3	18
	7.2	15	7.3	18
	7.2	16	7.3	18
	7	15	7.3	18
Feb1995	7.3	16	7.3	18
	7.3	16	7.3	18
	7.3	16	7.3	18
	7.3	14	7.3	18
	7.4	14	7.3	18
	7.2	14	7.3	18
	7.3	13	7.3	18
	7.3	14	7.3	18

	7.3	14		18
	7.3	14		18
	7.1	15	[illegible]	19
	7.3	15	7.3	19
	7.3	15	7.3	19
	7.2	15	7.3	19
	7.2	14	7.3	19
	7.3	15	7.3	19
	7.2	15	7.3	19
	7.3	15	7.3	19
	7.3	15	7.3	19
	7.2	17	7.3	19
	7.2	16	7.3	19
	7.3	15	7.3	19
	7.2	15	7.3	19
	7.2	16	7.3	19
	7.3	15	7.3	19
	7.2	15	7.3	19
	7.3	15	7.3	19
	7.1	15	7.3	19
Mar1995	7.1	15	7.3	19
	7.1	15	7.3	19
	7.2	15	7.3	19
	7.3	15	7.3	19
	7.3	16	7.3	19
	7.2	17	7.3	19
	7.2	17	7.3	19
	7.2	18	7.3	19
	7.1	15	7.3	19
	7.1	14	7.3	19
	7.2	15	7.3	19
	7.2	16	7.3	19
	7.2	17	7.3	19
	7.2	18	7.3	19
	7.3	17	7.3	19
	7.2	18	7.3	19
	7.3	18	7.3	19
	7.1	18	7.3	19
	7.3	17	7.3	19
	7.3	17	7.3	19
	7	18	7.3	19
	7.2	18	7.3	19
	7.3	18	7.3	19
	7.3	17	7.3	19
	7.3	18	7.3	19
	7.1	17	7.3	19
	7.2	18	7.3	19
	7.3	18	7.3	19
	7.4	17	7.3	19
	7.3	18	7.3	19
	7.3	18	7.3	19
November1995	7.3	23	7.3	19
	7.2	23	7.3	19
	7.2	23	7.3	19
	7.3	22	7.3	19
	7.2	20	7.3	19
	7.1	22	7.3	19
	7.2	22	7.3	19
	7.2	21	7.3	19
	7.3	21	7.3	19
	7.2	21	7.3	19
	7.3	21	7.3	19
	7.2	19	7.3	19
	7.1	20	7.3	19
	7.2	19	7.3	19
	7	20	7.3	19
	7.1	19	7.3	19
	7.2	19	7.3	19
	7.2	20	7.3	19
	7.3	20	7.3	19
	7.2	20	7.3	19
	7.3	20	7.3	19
	7.4	20	7.3	19
	7.2	20	7.3	19
	7.4	20	7.3	19
	7.5	20	7.3	19
	7.4	20	7.3	19
	7.3	20	7.3	19
	7.3	21	7.3	19
	7.2	20	7.3	19
	7.2	19	7.3	19
Dec1995	7.1	19	7.3	19
	7.1	19	7.3	19
	7	20	7.3	19
	7	20	7.3	19
	7.2	20	7.3	19
	7.2	20	7.3	19
	7.3	19	7.3	19
	7.2	19	7.3	19
	7.1	19	7.3	19
	7.4	18	7.3	19
	7.2	18	7.3	19

	7.4	17		19
	7.3	18		19
	7.4	18	[illegible]	19
	7.1	17	7.3	19
	7.2	19	7.3	19
	7.2	18	7.3	19
	7.2	18	7.3	19
	7.3	17	7.3	19
	7	17	7.3	19
	7.1	17	7.3	19
	7.3	17	7.3	19
	7.4	17	7.3	19
	7.2	17	7.3	19
	7.3	17	7.3	20
	7.3	17	7.3	20
	7.1	17	7.3	20
	7.3	16	7.3	20
	7.3	17	7.3	20
	7.4	17	7.3	20
	7.2	16	7.3	20
Jan1996	7.1	16	7.3	20
	7.2	17	7.3	20
	7	17	7.3	20
	7.2	16	7.3	20
	7.1	16	7.3	20
	7.4	16	7.3	20
	7.4	16	7.3	20
	7.4	15	7.3	20
	7	14	7.3	20
	7.2	16	7.3	20
	7.2	16	7.3	20
	7	15	7.3	20
	7.1	15	7.3	20
	7	16	7.3	20
	7.2	16	7.3	20
	7	16	7.3	20
	7	16	7.3	20
	7.3	16	7.3	20
	6.9	16	7.3	20
	7.1	18	7.3	20
	7.3	14	7.3	20
	7	15	7.3	20
	7	14	7.3	20
	7.1	16	7.3	20
	7.2	15	7.3	20
	7.1	16	7.3	20
	6.7	16	7.3	20
	7.1	14	7.3	20
	7.2	16	7.3	20
	7.2	16	7.3	20
	7.2	16	7.3	20
Feb1996	7.3	15	7.3	20
	7.3	15	7.3	20
	7.2	16	7.3	20
	7.1	16	7.3	20
	7	13	7.3	20
	7.3	14	7.3	20
	7.2	15	7.3	20
	7.2	15	7.3	20
	7.2	16	7.3	20
	7	15	7.3	20
	7	16	7.3	20
	7.3	15	7.3	20
	7.2	13	7.3	20
	7.3	15	7.3	20
	7.3	16	7.3	20
	7.4	16	7.3	20
	7.3	14	7.3	20
	7.2	14	7.3	20
	7.1	16	7.3	20
	7.1	17	7.3	20
	7.1	17	7.3	20
	7.2	17	7.3	20
	7.3	17	7.3	20
	7.3	17	7.4	20
	7.3	17	7.4	20
	7.3	16	7.4	20
	7.2	17	7.4	20
	7.2	18	7.4	20
	7.3	16	7.4	21
March1996	7.3	16	7.4	21
	7.4	15	7.4	21
	7.4	16	7.4	21
	7.3	15	7.4	21
	7.3	16	7.4	21
	7.3	17	7.4	21
	7.4	17	7.4	21
	7.4	15	7.4	21
	7.1	14	7.4	21
	7.2	16	7.4	21
	7	16	7.4	21
	7.2	14	7.4	21

	7.2	16		*21
	7	16		21
	7.2	17	...	21
	7.3	17	7.4	21
	7.1	17	7.4	21
	7.2	17	7.4	21
	7.3	17	7.4	21
	7	16	7.4	21
	7.3	16	7.4	21
	7.3	16	7.4	21
	7.6	15	7.4	21
	7.4	17	7.4	21
	7.4	16	7.4	21
	7.4	18	7.4	21
	7.4	17	7.4	21
	7.3	17	7.4	21
	7	16	*7.4	21
	7	16	7.4	21
	7.1	17	7.4	21
November1996	6.8	22	7.4	21
	7	22	7.4	21
	7	22	7.4	21
	6.9	22	7.4	21
	7.1	22	7.4	21
	7.2	21	7.4	21
	7	22	7.4	21
	6.6	23	7.4	21
	6.9	19	7.4	21
	6.9	20	7.4	21
	7.3	21	7.4	21
	7.2	20	7.4	21
	7.5	20	7.4	21
	7.4	19	7.4	21
	7.4	20	7.4	21
	7.4	19	7.4	21
	7.3	19	7.4	21
	7.3	20	7.4	21
	7.4	21	7.4	21
	7.4	20	7.4	21
	7.4	20	7.4	22
	7.4	20	7.4	22
	7.6	18	7.4	22
	7.3	19	7.4	22
	7.2	20	7.4	22
	7.1	21	7.4	22
	7	18	7.4	22
	7	18	7.4	22
	7.3	18	7.4	22
	7.1	19	7.4	22
December1996	6.9	19	7.4	22
	7	19	7.4	22
	7.2	18	7.4	22
	7.2	19	7.4	22
	7.4	19	7.4	22
	7.3	19	7.4	22
	7.5	17	7.4	22
	7.4	18	7.4	22
	7.3	18	7.4	22
	7.3	18	7.4	22
	7.4	18	7.4	22
	7.3	18	7.4	22
	7.2	18	7.4	22
	7	17	7.4	22
	7.2	17	7.4	22
	7.2	18	7.4	22
	7.2	18	7.4	22
	7.3	18	7.4	22
	7.3	18	7.4	22
	7.3	17	7.4	22
	7.3	17	7.4	22
	7.3	17	7.4	22
	7.2	17	7.4	22
	7.3	18	7.4	22
	7.2	17	7.4	22
	7.4	18	7.5	22
	7.3	16	7.5	22
	7.3	18	7.5	22
	7.2	17	7.5	22
	7.4	19	7.5	23
	7.3	18	7.5	23
Jan1997	7.5	17	7.5	23
	7.2	18	7.5	23
	7.2	19	7.5	23
	7.7	18	7.5	23
	7.1	19	7.5	23
	7.3	18	7.5	23
	7.3	18	7.5	23
	7.3	17	7.5	23
	7.2	17	7.5	23
	7.3	17	7.5	23
	7.4	17	7.5	23
	7.1	16	7.5	24

Nov- Mar 90th Percentiles

7.3	16		24
7.3	16		
7.4	16		
7.2	17	7.6	
7.3	15	7.6	
7.3	14	7.6	
7.4	14	7.6	
7.2	17	7.6	
7.3	15	7.6	
7.1	17	7.6	
7.3	17	7.6	
7.3	17	7.6	
6.6	16	7.6	
6.6	16	7.6	
6.5	16	7.6	
6.4	16	7.6	
6.4	16	7.6	
6.4	16	7.6	
6.9	17	7.7	
N=939	N=921		

90^{th} Percentile Values

pH $(939 \times 90) \div 100 = 845.1$ or 845^{th} value

Temp $(921 \times 90) \div 100 = 828.9$ or 829^{th} value

Facility = Noman Cole November - March Using the 2008 Data
Chemical = Ammonia
Chronic averaging period = 30
~~WLAa = 33.8~~
WLAc = 4.11
Q.L. = .2
# samples/mo. = 30
# samples/wk. = 8

data is expressed in mg/L.

JCC

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 8.29262408394104
Average Weekly limit = 4.94659244154608
Average Monthly LImit = 4.11

The data are:

9

Facility = Noman Cole - April - October Using 2008 Data
Chemical = Ammmonia
Chronic averaging period = 30
~~WLAa = 26~~
WLAc = 2.4
Q.L. = .2
# samples/mo. = 30
# samples/wk. = 8

data expressed in mg/L

PPRE effluent limits are in effect for this time period -

JC

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 4.84240822419915
Average Weekly limit = 2.88852113374953
Average Monthly LImit = 2.4

The data are:

9

Facility = Noman Cole
Chemical = Chlorine
Chronic averaging period = 4
WLAa = 19
WLAc = 11
Q.L. = 100
# samples/mo. = 30
# samples/wk. = 8

data expressed in ug/L.

JC 7/29/08

Summary of Statistics:

observations = 1
Expected Value = 200
Variance = 14400
C.V. = 0.6
97th percentile daily values = 486.683
97th percentile 4 day average = 332.758
97th percentile 30 day average= 241.210
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 16.0883226245855
Average Weekly limit = 9.59676626920107
Average Monthly LImit = 7.9737131838758

The data are:

200

This book contains model printouts used in the "Engineering Study for the Expansion of the Lower Potomac Pollution Control Plant Beyond 54 MGD", Project No. 524/N00321, Contract No. AE 24064. The two models utilized were Virginia Institute of Marine Science Gunston Cove (VIMS) and the Potomac Eutrophication Model (PEM-1991). The VIMS Model was run by Limno-Tech, Inc. in March 1992 using input environmental conditions presented in Volume I Chapter 4.4 and PEM-1991 was run by Metropolitan Washington Council of Government (MWCOG) in March 1992. The summary results of these model runs is presented in Volume I Chapter 4.5.

TABLE 4.7

LPPCP EFFLUENT LIMITATION SCENARIOS FOR THE EXISTING OUTFALL LOCATION

Case	Description	Period of Time	$CBOD_5$ (mg/l) (1)	Total Phosphorus (mg P/l)	Organic Nitrogen (mg N/l)	Ammonia Nitrogen (mg N/l)	Nitrite + Nitrate Nitrogen (mg N/1)
A	Baseline	Year Round	5	0.18	2	17	2
B	Seasonal ammonia removal	April 1-October 31	5	0.18	2	1	18
		November 1-March 31	5	0.18	2	17	2
C	Constant ammonia removal	Year Round	5	0.18	2	1	18
D	Seasonal total nitrogen removal to 3 mg/l	April 1-October 31	5	0.18	1	1	1
		November 1-March 31	5	0.18	2	17	2
E	Total nitrogen removal to 3 mg/l	Year Round	5	0.18	1	1	1
F	Seasonal total nitrogen removal to 10 mg/l	April 1-October 31	5	0.18	1	1	8
		November 1-March 31	5	0.18	2	17	2
G	Total nitrogen removal to 10 mg/l	Year Round	5	0.18	1	1	8
H	Seasonally varying ammonia removal	April 1-October 31	5	0.18	2	1	18
		November 1-March 31	5	0.18	2	2	17

(1) $CBOD_5$ = Five-day carbonaceous biochemical oxygen demand.

MS\FB501A\FBM087AC.TBL

- Scenario E considers year-round total nitrogen removal to 3 mg/l (the most stringent treatment required).
- Scenario F consists of seasonal total nitrogen removal to 10 mg/l, and cold weather treatment consistent with the baseline.
- Scenario G consists of year-round total nitrogen removal to 10 mg/l.
- Scenario H considers seasonally varying levels of ammonia removal.

4.5.3 Model Simulations

Specific simulations were conducted using the VIMS Gunston Cove Model for pollutant impacts within Gunston Cove and the PEM-1991 for impacts in the mainstem Potomac River. Since the results of the PEM-1991 model runs are used as boundary conditions for the VIMS model, the PEM-1991 results are discussed first.

Potomac Eutrophication Model

The PEM-1991 was used to predict water quality in the mainstem Potomac estuary in response to the four year-round scenarios (Scenario A, Scenario C, Scenario E, and Scenario G).

The purpose of the PEM simulations was twofold: 1) to predict water quality at the Gunston Cove-Potomac River boundary for use as input to the VIMS model, and 2) to predict water quality concentrations in the mainstem of the Potomac River in response to the effluent limitation scenarios. Each of the four scenarios was evaluated by performing PEM-1991 simulations for a sufficient time period such that there were no day-to-day changes in predicted water quality.

An important assumption made for this analysis was that the four treatment scenarios tested with the PEM were part of a regionally consistent wastewater treatment strategy. The basic assumption in this evaluation will be that <u>all</u> Washington-area Potomac River WWTPs would treat at the same level as LPPCP for each case. Non-Virginia WWTPs would follow suit where the effluent limitations are more stringent than currently permitted, but effluent limitations would not "backslide" beyond current levels. For example, Blue Plains and Piscataway WWTPs would not discontinue nitrifying and revert back to the ammonia limit of 17 mg/l suggested in Scenario A. Instead, their current limits will remain in place in cases where current limitations are stricter than those in Table 4.7.

Virginia Institute of Marine Sciences Gunston Cove Model

The VIMS Gunston Cove Model was used to predict dissolved oxygen and chlorophyll *a* concentrations within Gunston Cove in response to each effluent limitation scenario for LPPCP. Water quality at the Gunston Cove-Potomac River boundary was taken from the PEM simulation consistent with the warm weather treatment level for the scenario under consideration. Each scenario was evaluated by performing simulations for 40 consecutive days at the critical environmental conditions described in Section 4.4. After 40 days of simulation, model predictions were at steady-state conditions. This approach is the same as that taken by the NVPDC (1987) during the Potomac Embayments Wasteload Allocation Study.

The seasonally varying treatment scenarios were evaluated using the same approach discussed in Section 4.4. Specifically, the impact of relaxed cold weather treatment on summer critical conditions is represented in the model by increased summertime benthic flux rates. The change in benthic flux rates is determined by relative increase in algae and particulate phosphorus settling during periods of reduced treatment. Year-round VIMS model simulations were conducted to determine the difference in phosphorus and chlorophyll loading to sediments corresponding to each of the eight treatment scenarios. Concentrations at the Gunston Cove-Potomac River boundary were varied to represent observed seasonal trends in water quality. The Potomac River boundary concentration was not changed between effluent limitation scenarios, on the assumption that only LPPCP would have seasonally varying treatment, with all other discharges at baseline levels. This contrasts with the year-round simulations, which assumed that all regional WWTPs would follow a regionally consistent wastewater treatment strategy. Effluent limitations at other regional WWTPs were not changed because: 1) this approach was consistent with the seasonally varying treatment analyses conducted by NVPDC (1987); and 2) the effect of region-wide seasonal treatment on Gunston Cove boundary conditions cannot be readily determined.

The difference in pollutant flux to the sediments between scenarios was insignificant (less than 0.1 percent) for all cases. The reason for similar pollutant flux to the sediments among all scenarios is that the only difference between scenarios is the extent of nitrogen removal. Since algal growth in Gunston Cove is not nitrogen-limited under baseline conditions (i.e., without region-wide total nitrogen removal), changes in nitrogen removal at LPPCP alone have little effect on algal levels or net biomass settling in the cove.

Benthic flux rates therefore are expected to remain constant across all eight treatment scenarios. Because there is no change in benthic flux rates corresponding to seasonal treatment, water quality impacts during summer critical conditions will be influenced solely by the treatment processes operating during the warm weather. This means identical model results will be obtained for those scenarios with identical warm weather treatment levels (i.e., Scenarios B, C, and H will be identical; Scenarios D and E will be identical; and Scenarios F and G will be identical).

4.5.4 Model Results

Results for all model simulations are provided below in both tabular and graphic formats. Impacts on the mainstem of the Potomac River and within Gunston Cove are described separately.

Potomac River

The predicted dissolved oxygen concentration in the Potomac River was 7.0 mg/l under the Blue Plains Feasibility Study's critical conditions. This value is well above the required Virginia dissolved oxygen standards of 5.0 mg/l. Predicted Potomac River chlorophyll *a* concentrations in the vicinity of Gunston Cove are shown in Table 4.8 for the four year-round scenarios.

It is important to note some differences in the PEM-1991 results compared to the PEM-1982 results used in the Potomac Embayments Wasteload Allocation Study (NVPDC, 1987). One primary difference was the addition of a new state variable to PEM-1991, representing the blue-green algae *Microcystis*. In the steady-state PEM simulations conducted for this study, *Microcystis* concentrations were predicted to go to zero since *Microcystis* has a competitive advantage over other algal species during periods of low wind. The PEM simulations for this study considered summer average wind speed, under which *Microcystis* apparently has no competitive advantage. The best method in which to consider *Microcystis* impacts, which appear related to short-term periods of decreased wind, will be an important question for MWCOG to consider in future PEM applications, but is not part of this study.

Another significant difference is that predicted Potomac estuary phosphorus concentrations are more than twice as high in the PEM-1991 results as those received from PEM-1982. More importantly, the PEM-1991 predicted available phosphorus (i.e., dissolved inorganic phosphorus) concentrations of up to 15 times higher than those obtained from PEM-1982. This difference is primarily caused by the change in the sediment phosphorus release predictions between the two models. The PEM-1991 contains a new (compared to PEM-1982) sediment phosphorus release framework which considers the effect of overlying water pH on sediment phosphorus releases.

An important feature of the newer model results is that predicted chlorophyll *a* concentrations for the baseline scenario are lower than those predicted for ammonia removal or total nitrogen removal to 10 mg/l. This is caused by the fact that PEM inputs for scenarios considering ammonia removal assume lower effluent alkalinity than for the baseline scenario. This reduced alkalinity lowers the buffering capacity of the Potomac River, and leads to an increase in pH-mediated sediment release, thus increasing chlorophyll *a* levels.

<u>Gunston Cove</u>

The results of the VIMS model predictions of dissolved oxygen and chlorophyll *a* are summarized in Table 4.9, and shown graphically in Figures 4-9 and 4-10 (for dissolved oxygen) and Figure 4-11 (for chlorophyll *a*). All predicted concentrations are in clear compliance with Virginia's dissolved oxygen standards (daily minimum = 4.0 mg/l, daily average = 5.0 mg/l). The baseline scenario shows that ammonia removal is not required to meet dissolved oxygen standards even during warm weather periods.

TABLE 4.8

PREDICTED POTOMAC RIVER CHLOROPHYLL *a* CONCENTRATIONS IN THE VICINITY OF GUNSTON COVE

Scenario	Chlorophyll *a* (μg/l) (1)
A: Baseline	58
C: Ammonia Removal to 1 mg/l	64
E: Total Nitrogen Removal to 3 mg/l	41
G: Total Nitrogen Removal to 10 mg/l	64

(1) The chlorophyll *a* goal is a maximum concentration of 100 μg/l (NVPDC, 1987).

MS\FBS01A\FBM087AD.TBL

TABLE 4.9

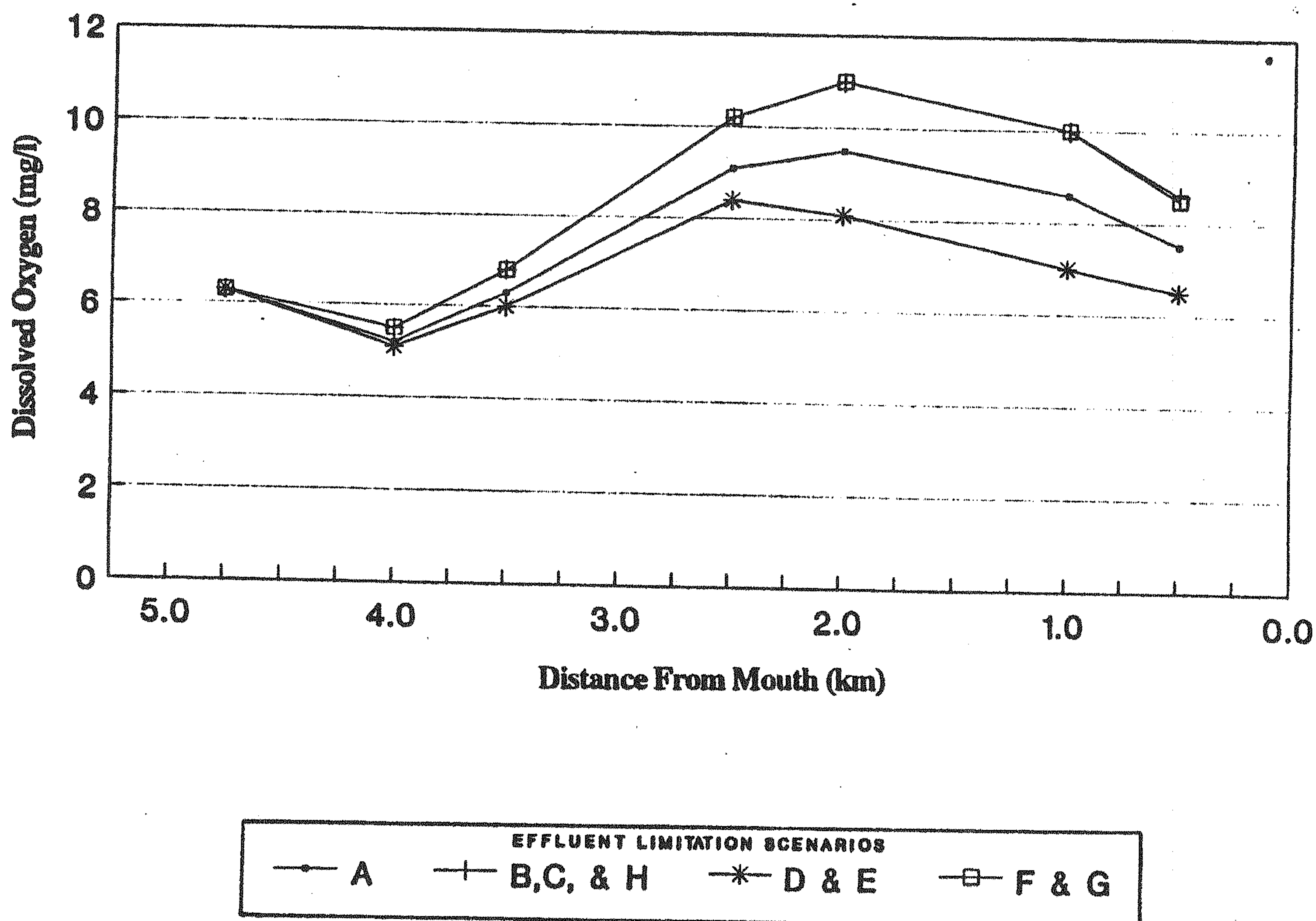
PREDICTED GUNSTON COVE WATER QUALITY

Scenario	Lowest Daily Minimum Dissolved Oxygen (mg/l)	Lowest Daily Average Dissolved Oxygen (mg/l)	Highest Chlorophyll *a* (μg/l) (1)
A	5.3	6.2	97
B	5.6	6.4	103
C	5.6	6.4	103
D	5.2	6.0	77
E	5.2	6.0	77
F	5.6	6.4	103
G	5.6	6.4	103
H	5.6	6.4	103

(1) The chlorophyll *a* goal is a maximum concentration of 100 μg/l (NVPDC, 1987).

FIGURE 4-9

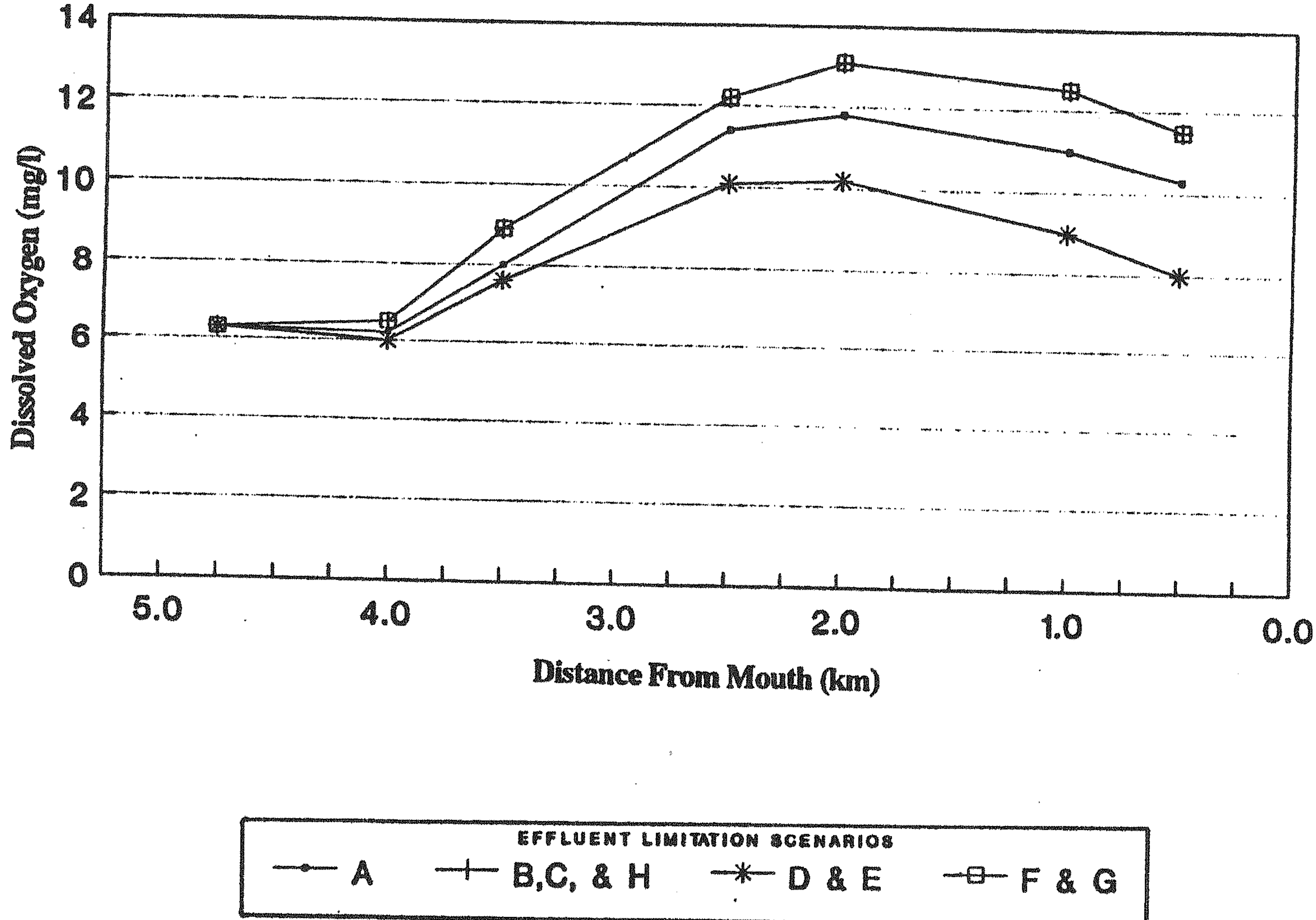
PREDICTED GUNSTON COVE DAILY MINIMUM DISSOLVED OXYGEN



PARSONS / ES ENGINEERING-SCIENCE

FIGURE 4-10

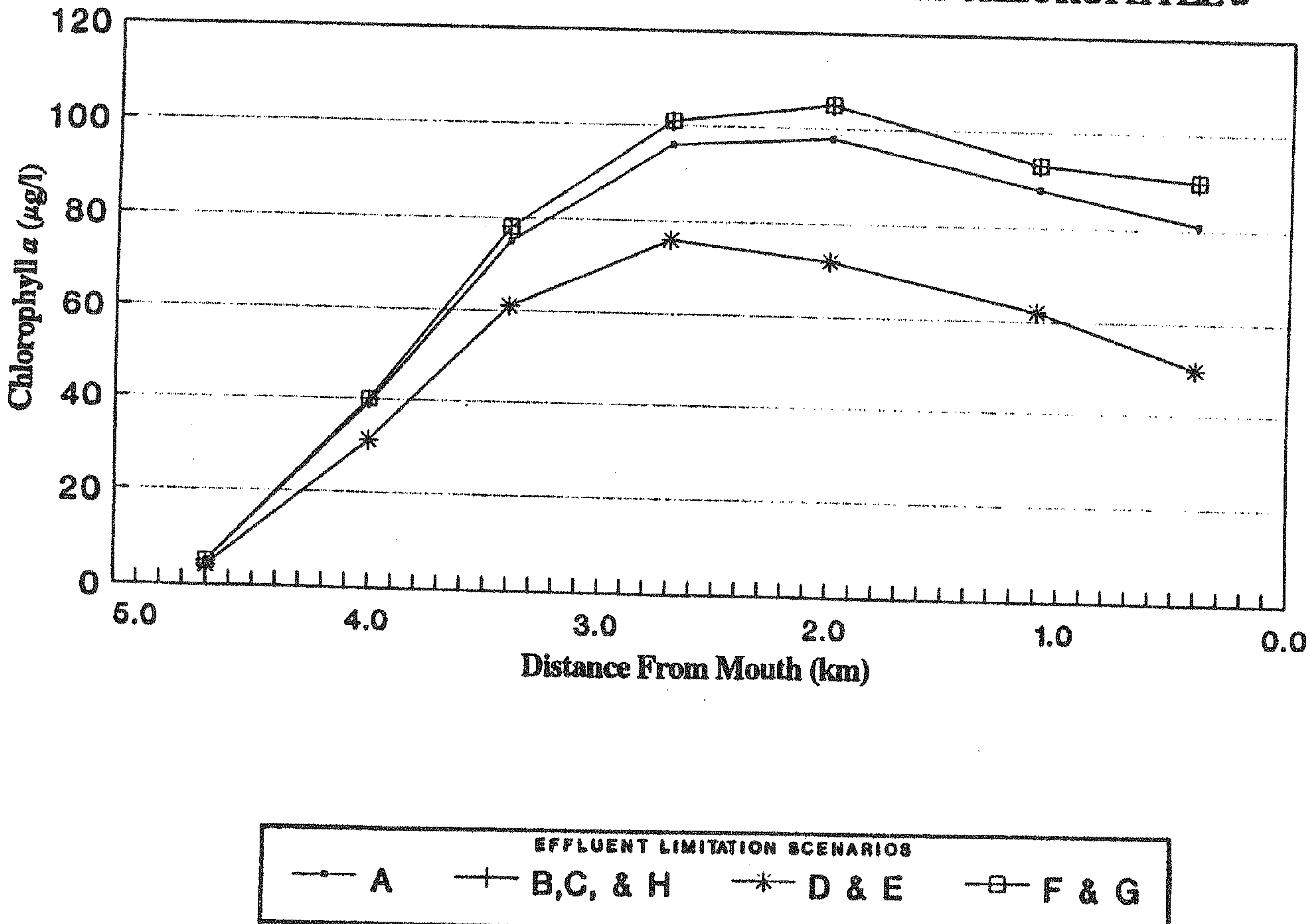
PREDICTED GUNSTON COVE DAILY AVERAGE DISSOLVED OXYGEN



PARSONS / ES ENGINEERING-SCIENCE

FIGURE 4-11

PREDICTED GUNSTON COVE DAILY MAXIMUM CHLOROPHYLL *a*



PARSONS / ES ENGINEERING-SCIENCE

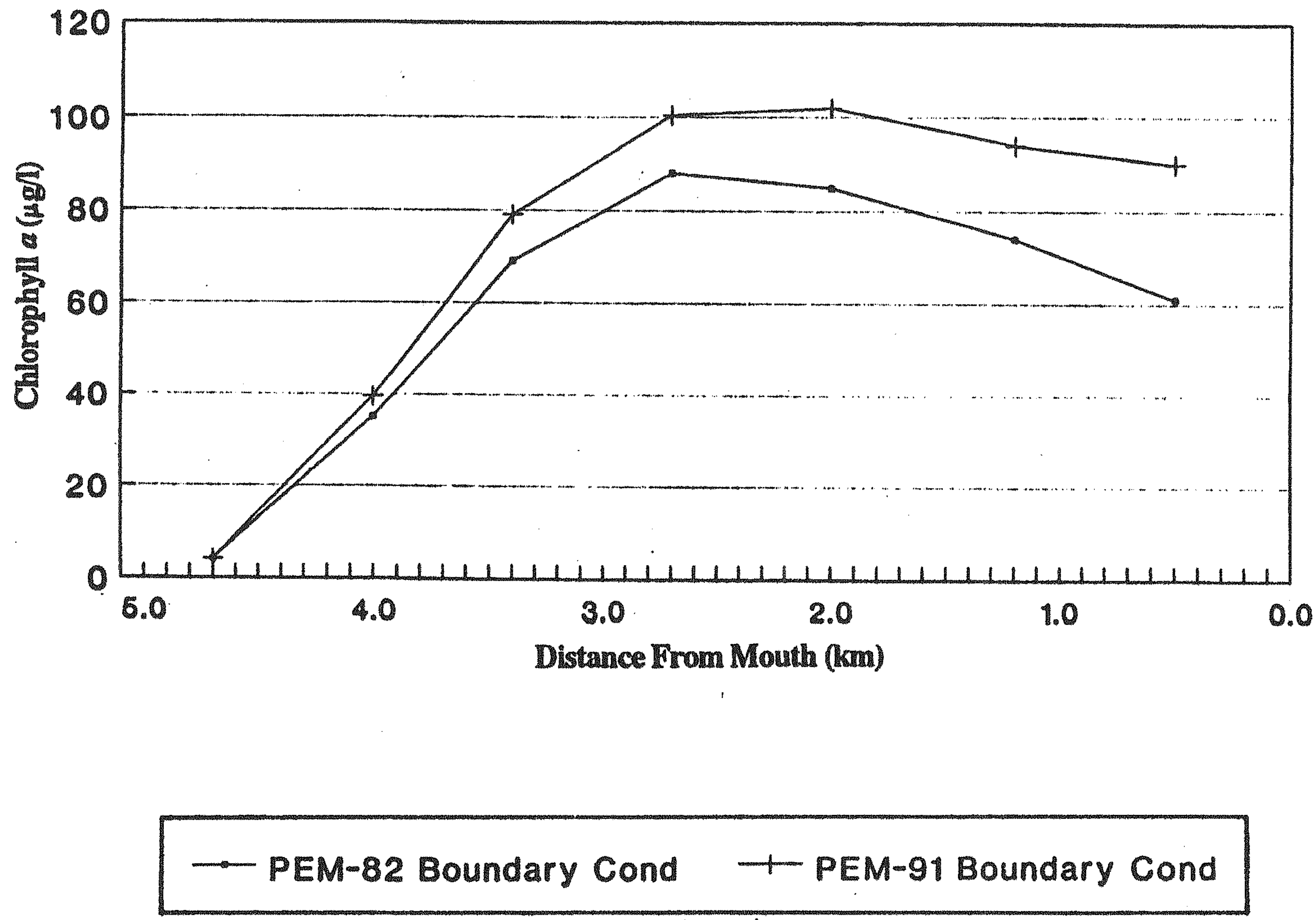
Predicted chlorophyll *a* concentrations (Figure 4-11) slightly exceed the 100 μg/l chlorophyll *a* goal for Gunston Cove for the ammonia removal scenarios (Scenarios B, C, and H) and for the total nitrogen removal to 10 mg/l scenarios (Scenarios F and G). These results directly contrast with previous studies, which indicated that effluent phosphorus concentrations of 0.18 mg/l (regardless of nitrogen concentration) would result in compliance with the 100 μg/l chlorophyll *a* goal.

The difference between past and present VIMS model chlorophyll *a* predictions can be traced to assumptions made regarding water quality at the Gunston Cove-Potomac River boundary. The importance of PEM-predicted Potomac boundary conditions on predicted Gunston Cove chlorophyll *a* concentrations is demonstrated in Figure 4-12. The figure compares VIMS model-predicted chlorophyll *a* concentrations within Gunston Cove for each of two boundary condition assumptions: the PEM-1982 boundary used in the NVPDC (1987) study and the PEM-1991 results generated for this study. For identical effluent conditions at LPPCP (corresponding to Scenario C), the different boundary assumptions result in differences of up to 29 μg/l chlorophyll *a* in Gunston Cove. The difference is due primarily to increased phosphorus concentrations at the boundary, as chlorophyll *a* concentrations at the boundary differ by only 12 μg/l (50 μg/l for PEM-1982 versus 62 μg/l for PEM-1991).

Predicted maximum Gunston Cove chlorophyll *a* concentrations for six of the eight scenarios are within 3 μg/l of the 100 μg/l chlorophyll *a* goal. Scenario A (baseline treatment) just results in compliance with the goal, while Scenarios B, C, F, G, and H (ammonia removal and total nitrogen removal to 10 mg/l) just exceed the goal. The cause of the difference between these scenarios is the variation in PEM-predicted concentrations at the Gunston Cove-Potomac River boundary. As discussed previously, the cause of the difference in PEM predictions is the assumption that ammonia removal reduces the alkalinity of the effluent, which reduces the capacity of Potomac River water to buffer against pH-mediated sediment phosphorus release.

FIGURE 4-12

MAXIMUM CHLOROPHYLL *a* IN GUNSTON COVE UNDER VARIOUS POTOMAC BOUNDARY ASSUMPTIONS



PARSONS / ES ENGINEERING-SCIENCE

4.5.5 Summary

Eight conventional pollutant treatment scenarios were tested for their impacts on Gunston Cove and Potomac River water quality. All eight scenarios result in predicted compliance with Virginia's dissolved oxygen standards, indicating that additional ammonia removal will not be required to protect dissolved oxygen.

The PEM-1991 results indicate that nitrogen removal at all regional wastewater treatment plants would have an impact on Potomac estuary chlorophyll *a* concentrations in the vicinity of Gunston Cove. These results, used in conjunction with VIMS Gunston Cove Model predictions for Gunston Cove, indicate that total nitrogen removal to 3 mg/l will clearly meet the 100 μg/l chlorophyll *a* objective within Gunston Cove. These PEM-1991 predictions do not, however, address the likely possibility of proliferating nitrogen-fixing blue-green algae associated with regional total nitrogen removal, which could negate any predicted reduction in chlorophyll *a*. The VIMS model predictions for all other effluent treatment scenarios result in predicted maximum chlorophyll *a* concentrations within 3 μg/l of the 100 μg/l goal, ranging from 97 to 103 μg/l. Model results indicate that nitrogen removal at LPPCP alone (with all other regional plants at their baseline levels) does not lead to a noticeable improvement in Gunston Cove water quality. Instead, due to tidal influence, water quality in Gunston Cove is largely determined by water quality in the Potomac River.

Chlorophyll *a* predictions within Gunston Cove are very sensitive to assumed concentrations at the Gunston Cove-Potomac River boundary. The use of PEM-1982 predictions to define Gunston Cove boundary conditions results in predicted achievement of the 100 μg/l chlorophyll *a* goal for all scenarios. The increase in predicted Gunston Cove chlorophyll *a* concentrations (over previous modeling studies) is caused primarily by improvements made in the PEM's sediment phosphorus release between the 1982 and 1991 versions and not by expansion of the LPPCP.

4.6 SUMMARY

Applicable water quality regulations and water quality models related to the LPPCP expansion were reviewed, along with simulations of conventional pollutant impacts (i.e. dissolved oxygen, chlorophyll *a*) at the present outfall location. The primary water quality regulations relevant to the LPPCP expansion are contained in the May 1992 Virginia Water Quality Standards. These establish the water quality conditions that must be maintained in Virginia waters. The Potomac Embayment Standards were not addressed or changed under the recent amendments to Virginia standards. However, recent revisions to the Potomac Embayment Standards by Fairfax County were forwarded to the VSWCB for review in October 1992. This represents a source of uncertainty to LPPCP expansion requirements, as future revisions to the Potomac Embayment Standards could affect required treatment levels at LPPCP.

A matrix of models (Table 4.2) has been recommended for use in this study, with different models best suited for specific pollutants and discharge locations. The recommended models consist of:

- Virginia Institute of Marine Sciences Gunston Cove Model: Simulation of conventional and far-field toxic impacts within Gunston Cove.
- Dynamic Estuary Model: Simulation of dissolved oxygen and far-field toxic impacts in the mainstem of the Potomac River.
- Potomac Eutrophication Model (PEM-1991): Simulation of eutrophication impacts in the mainstem of the Potomac River.
- CORMIX2: Simulation of near-field (mixing zone) toxic inputs in Gunston Cove and the Potomac River.

Each model to be applied as part of this study requires unique information regarding environmental conditions. An acceptable approach to defining environmental conditions for these models has already been developed and will be followed for this study. The established precedent for conventional pollutant modeling in Gunston Cove is to use statistically defined "critical" values for the most important model inputs and to use the average observed values for other inputs. Mainstem Potomac boundary conditions will be based on the PEM-1991 predictions, as historical data do not represent recent improvements in the Potomac River water quality in response to improved regional wastewater treatment. Little accepted precedent exists for toxicity and toxic pollutant modeling. Environmental conditions selected for modeling these parameters are based upon existing USEPA guidance and best professional judgement. The most significant environmental condition for assessing toxicity and toxic pollutant impacts at the present outfall location is upstream Pohick Creek flow. The 1Q10 will be used as upstream Pohick Creek flow when assessing potential acute toxicity impacts. The 7Q10 will be used when evaluating potential chronic toxicity impacts.

Eight conventional pollutant treatment scenarios (Scenarios A through H) were tested for their impacts on Gunston Cove and Potomac River water quality. All eight scenarios result in predicted compliance with Virginia dissolved oxygen standards, indicating that additional ammonia removal will not be required to protect dissolved oxygen.

The PEM-1991 results indicate that nitrogen removal at all regional wastewater treatment plants would have an impact on chlorophyll *a* concentrations in the vicinity of Gunston Cove. The model results indicate that total nitrogen removal to 3 mg/l will clearly meet the 100 μg/l chlorophyll *a* goal within Gunston Cove; however, the PEM-1991 predictions do not address the likelihood of proliferating nitrogen-fixing blue-green algae associated with regional total nitrogen removal. The VIMS model predictions for all other effluent treatment scenarios result in predicted maximum chlorophyll *a* concentrations near the 100 μg/l goal, with values ranging from 97 μg/l to 103 μg/l. Model results also indicate that due to tidal influence, water quality in Gunston Cove is largely determined by water quality in the Potomac River. Therefore, nitrogen removal at the LPPCP alone (with all other regional plants at their baseline levels) does not result in a predicted noticeable improvement in Gunston Cove water quality.

POTOMAC EMBAYMENTS
WASTELOAD ALLOCATION STUDY
FINAL REPORT, VOLUME I

Prepared for

Commonwealth of Virginia
State Water Control Board
2111 North Hamilton Street
Richmond, Virginia 23230

Prepared by

Northern Virginia Planning District Commission
7630 Little River Turnpike, Suite 400
Annandale, Virginia 22003

(Staff Technical Analysis)

With Technical Assistance Provided by
Camp Dresser & McKee

June 12, 1987

CONTENTS

POTOMAC EMBAYMENTS WASTELOAD ALLOCATION STUDY
FINAL REPORT, VOLUME I:
Study Methodology, Water Quality Goals,
and Loading and Debugging of Computer Models

EXECUTIVE SUMMARY

The initial stages of the Potomac Embayments Wasteload Allocation Study lay the groundwork for the technical analyses that are performed to develop recommended effluent limits for point source discharges to seven Virginia embayments of the Potomac Estuary. First, modeling tools to be used in the study are obtained and tested. Next, a regionally consistent methodology for wasteload allocation analysis is developed. Finally, water quality goals are developed for use as evaluation criteria in screening wasteload allocation alternatives in later stages of the study.

Embayment hydrodynamics and water quality models developed by the Virginia Institute of Marine Science (VIMS) are obtained from VIMS and loaded onto the mainframe computer system used by NVPDC. The computer codes are modified as necessary to ensure successful operation on the system. The model codes are further modified to enhance their capability and, in several cases, to correct minor errors.

The regionally consistent methodology established for the study defines the modeling approach and the general procedures for establishing design conditions, defining water quality goals, performing sensitivity studies, and completing final wasteload allocation analyses. As part of the methodology, specific data for computer model application are developed, including nonpoint loadings, Potomac main stem boundary conditions, and design values for tidal ranges, streamflows, water temperature, and solar radiation.

The water quality goals established for the study focus primarily on concentrations of dissolved oxygen and chlorophyll-a. The selected dissolved oxygen goals are the Virginia state water quality standards of 5.0 mg/L daily average and 4.0 mg/L daily minimum. Chlorophyll-a goals are developed based on the concept of no further deterioration of existing conditions, which is consistent with the State's antidegradation policy. Specific chlorophyll-a goals are established for each embayment, primarily based on computer model simulations that show the impacts of point source loadings and Potomac main stem boundary conditions on chlorophyll-a concentrations throughout the embayment.

CONTENTS (CONTINUED)

POTOMAC EMBAYMENTS
WASTELOAD ALLOCATION STUDY
FINAL REPORT, VOLUME II

Prepared for

Commonwealth of Virginia
State Water Control Board
2111 North Hamilton Street
Richmond, Virginia 23230

Prepared by

Northern Virginia Planning District Commission
7630 Little River Turnpike, Suite 400
Annandale, Virginia 22003

(Staff Technical Analysis)

With Technical Assistance Provided by
Camp Dresser & McKee

June 12, 1987

POTOMAC EMBAYMENTS WASTELOAD ALLOCATION STUDY
FINAL REPORT, VOLUME II:

Sensitivity Studies and Final Analyses for the
Little Hunting Creek, Gunston Cove, Belmont-Occoquan Bay,
and Aquia Creek Embayments

EXECUTIVE SUMMARY

In accordance with the regionally consistent methodology presented in the Volume I final report, NVPDC and CDM conduct sensitivity studies and final analyses for the Little Hunting Creek, Gunston Cove, Belmont-Occoquan Bay, and Aquia Creek embayments. Modeling tools developed by the Virginia Institute of Marine Science are used to predict the embayment water quality impacts of alternative treatment plant wasteloads. The modeling results are compared to water quality goals developed and presented in the Volume I final report to determine appropriate treatment plant effluent limits.

The sensitivity studies predict the extent to which embayment water quality would be affected by changes in parameters such as treatment plant loading, Potomac main stem boundary conditions, benthic flux rates, and treatment plant discharge location. After comparing the modeling results to the appropriate water quality goals, several different wasteload allocation alternatives for each embayment are selected for further analysis.

For the alternatives selected in the sensitivity studies, the final analyses include a comparison of wastewater treatment costs and of pollutant exchange between the embayment and the Potomac main stem. In addition, analyses of seasonal treatment limits for phosphorus and unoxidized nitrogen are conducted. The analysis of seasonal phosphorus removal is limited by a lack of data; as a result, no recommendations are made regarding the feasibility of seasonal phosphorus limits.

Based on the sensitivity studies and final analyses, the following effluent limits for dissolved oxygen (DO), 5-day carbonaceous biochemical oxygen demand (CBOD5), total Kjeldahl nitrogen (TKN), and total phosphorus (TP) are recommended for protection of embayment water quality:

EMBAYMENT	TREATMENT PLANT	PLANT FLOW (MGD)	RECOMMENDED EFFLUENT CONCENTRATION (mg/l) DO	CBOD5	TKN	TP
Little Hunting Creek	Little Hunting Creek*	6.0	6.0	10.0	5.0**	0.20
Gunston Cove	Lower Potomac	54.0	6.0	10.0	---	0.30
Belmont-Occoquan Bay	Lorton	1.0	6.0	30.0	---	1.00
	Harbor View	0.08	6.0	10.0	---	1.00
Aquia Creek	Aquia	3.0	6.0	10.0	10.0**	0.20

* Recommendation is based on the assumption of continued discharge from the plant to the Little Hunting Creek embayment. Fairfax County plans to close the plant, and has begun construction of pumpover facilities to the Lower Potomac Pollution Control Plant.

** April 1 through October 31 only; no TKN limits November 1 through March 31.

To protect the main stem of the Potomac Estuary, an interim total phosphorus limit of 0.18 mg/L is regionally accepted as presented in the Interim Control Policy of the 1986 Supplement to the Metropolitan Washington 208 Plan. Therefore, at the present time, the more restrictive constraint on total phosphorus is the 0.18 mg/L limit for protection of the main stem of the Potomac. As indicated in the 208 Plan Supplement, long-term Potomac studies now under way will better define the total phosphorus limits required for protection of the Potomac main stem.

BIOMONITORING RESULTS
Noman M. Cole Jr. Pollution Control Plant (VA0025364)

Table 1
Summary of Toxicity Test Results for Outfall 001

TEST DATE	TEST TYPE/ORGANISM	48-h LC_{50} (%)	IC_{25} (%)	NOEC (%)	% SURV	LAB	REMARKS
6/10/98	Acute *C. dubia*	>100			100	CBI	1st quarterly
6/10/98	Acute *P. promelas*	>100			95	CBI	
6/08/98	Chronic *C. dubia*			100 SR	100	CBI	
6/08/98	Chronic *P. promelas*			100 SG	90	CBI	
9/24/98	Acute *C. dubia*	>100			100	CBI	2nd quarterly
9/24/98	Acute *P. promelas*	**84.1**			35	CBI	
9/22/98	Chronic *C. dubia*			100 S **49.6 R**	90	CBI	
9/22/98	Chronic *P. promelas*			**49.6 SG**	0	CBI	
12/10/98	Acute *C. dubia*	>100			100	CBI	3rd quarterly
12/10/98	Acute *P. promelas*	>100			85	CBI	
12/08/98	Chronic *C. dubia*			100 SR	100	CBI	
12/08/98	Chronic *P. promelas*			**49.6 SG**	75	CBI	
TRE notification April 28, 1999							
12/02/02	Chronic *C. dubia*	>100	>100	100 SR	90	CBI	1st confirmation
12/02/02	Chronic *P. promelas*	>100	>100	100 SG	88	CBI	
12/10/02	Chronic *C. dubia*	>100	>100	100 SR	100	CBI	2nd confirmation
12/10/02	Chronic *P. promelas*	>100	>100	100 SG	100	CBI	
12/17/02	Chronic *C. dubia*	>100	>100	100 SR	90	CBI	3rd confirmation
12/17/02	Chronic *P. promelas*	>100	>100	100 SG	93	CBI	
01/13/03	Chronic *C. dubia*	>100	>100	100 SR	100	CBI	4th confirmation
01/13/03	Chronic *P. promelas*	>100	>100	100 SG	95	CBI	
Permit reissued April 13, 2003							
12/02/03	Chronic *C. dubia*	>100	>100	100 SR	80	CBI	1st annual
12/02/03	Chronic *P. promelas*	>100	>100	100 SG	95	CBI	
11/15/04	Chronic *C. dubia*	>100	>100	100 SR	100	CBI	2nd annual
11/15/04	Chronic *P. promelas*	>100	>100	100 SG	100	CBI	
11/14/05	Chronic *C. dubia*	>100	>100	100 SR	100	CBI	3rd annual
11/14/05	Chronic *P. promelas*	>100	>100	100 SG	100	CBI	
11/13/06	Chronic *C. dubia*	>100	>100	100SR	100	CBI	4th annual
11/13/06	Chronic *P. promelas*	>100	>100	100 SG	93	CBI	
10/22/07	Chronic *C. dubia*	>100	83.8	100 SR	100	CBI	5th annual
10/22/07	Chronic *P. promelas*	>100	>100	100 SG	98	CBI	
Permit reissued 29 September 2008							
05/04/09	Chronic *C. dubia*	>100	>100	100 SR	100	CBI	1st annual
05/04/09	Chronic *P. promelas*	>100	>100	100 SG	98		
05/03/10	Chronic *C. dubia*	>100	>100	100 SR	90	CBI	2nd annual
05/03/10	Chronic *P. promelas*	>100	>100	100 SG	98		
05/03/11	Chronic *C. dubia*	>100	>100	100 SR	100	CBI	3rd annual
05/03/11	Chronic *P. promelas*	>100	>100	100 SG	98		
05/14/12	Chronic *C. dubia*	>100	>100	100 SR	80	CBI	4th annual
05/14/12	Chronic *P. promelas*	>100	>100	100 SG	100		

FOOTNOTES:

A **bold** faced LC_{50} or NOEC value indicates that the test failed the criteria.

ABBREVIATIONS:

S - Survival; R - Reproduction; G - Growth
% SURV - Percent survival in 100% effluent
CBI - Coastal Bioanalysts, Inc

Spreadsheet for determination of WET test endpoints or WET limits

Excel 97
Revision Date: 01/10/05
File: WETLIM10.xls
(MIX.EXE required also)

Acute Endpoint/Permit Limit		Use as LC_{50} in Special Condition, as TUa on DMR				
ACUTE	100% =	NOAEC	LC_{50} = NA	% Use as	NA	TUa
ACUTE WLAa	0.3009403	Note: Inform the permittee that if the mean of the data exceeds this TUa: 1.0 a limit may result using WLA.EXE				

Chronic Endpoint/Permit Limit		Use as NOEC in Special Condition, as TUc on DMR				
CHRONIC	1.472179652 TU_c	NOEC =	68 %	Use as	1.47	TU_c
BOTH*	3.009403059 TU_c	NOEC =	34 %	Use as	2.94	TU_c
AML	1.472179652 TU_c	NOEC =	68 %	Use as	1.47	TU_c
ACUTE WLAa,c	3.00940299	Note: Inform the permittee that if the mean of the data exceeds this TUc: 1.0 a limit may result using WLA.EXE				
CHRONIC WLAc	1.00656716					

* Both means acute expressed as chronic

Enter data in the cells with blue type:

Entry Date:	05/09/13		
Facility Name:	Noman Cole		
VPDES Number:	VA0025364		
Outfall Number:	1		
		% Flow to be used from MIX.EXE	**Difuser /modeling study?**
Plant Flow:	67 MGD		Enter Y/N N
Acute 1Q10:	0.21 MGD	100 %	Acute 1 :1
Chronic 7Q10:	0.44 MGD	100 %	Chronic 1 :1

Are data available to calculate CV? (Y/N) N (Minimum of 10 data points, same species, needed) Go to Page 2
Are data available to calculate ACR? (Y/N) N (NOEC<LC50, do not use greater/less than data) Go to Page 3

IWC_a	99.6875465 %	Plant flow/plant flow + 1Q10
IWC_c	99.34756821 %	Plant flow/plant flow + 7Q10

NOTE: If the IWCa is >33%, specify the NOAEC = 100% test/endpoint for use

Dilution, acute	1.003134328	100/IWCa
Dilution, chronic	1.006567164	100/IWCc
WLA_a	0.300940299	Instream criterion (0.3 TUa) X's Dilution, acute
WLA_c	1.006567164	Instream criterion (1.0 TUc) X's Dilution, chronic
$WLA_{a,c}$	3.009402985	ACR X's WLA_a - converts acute WLA to chronic units
ACR -acute/chronic ratio	10	LC50/NOEC (Default is 10 - if data are available, use tables Page 3)
CV-Coefficient of variation	0.6	Default of 0.6 - if data are available, use tables Page 2)
Constants eA	0.4109447	Default = 0.41
eB	0.6010373	Default = 0.60
eC	2.4334175	Default = 2.43
eD	2.4334175	Default = 2.43 (1 samp) No. of samples 1

****The Maximum Daily Limit is calculated from the lowest LTA, X's eC. The LTAa,c and MDL using it are driven by the ACR.**

$LTA_{a,c}$	1.236698207	WLAa,c X's eA					
LTA_c	0.604984411	WLAc X's eB				Rounded NOEC's	%
MDL** with $LTA_{a,c}$	3.009403059	TU_c	NOEC =	33.229181	(Protects from acute/chronic toxicity)	NOEC =	34 %
MDL** with LTA_c	1.472179652	TU_c	NOEC =	67.926492	(Protects from chronic toxicity)	NOEC =	68 %
AML with lowest LTA	1.472179652	TU_c	NOEC =	67.926492	Lowest LTA X's eD	NOEC =	68

IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM TU_c to TU_a

						Rounded LC50's		%
MDL with $LTA_{a,c}$	0.300940306	TU_a	LC50 =	332.291814 %	Use NOAEC=100%	LC50 =	NA	%
MDL with LTA_c	0.147217965	TU_a	LC50 =	679.264924 %	Use NOAEC=100%	LC50 =	NA	

Page 2 - Follow the directions to develop a site specific CV (coefficient of variation)

IF YOU HAVE AT LEAST 10 DATA POINTS THAT ARE QUANTIFIABLE (NOT "<" OR ">") FOR A SPECIES, ENTER THE DATA IN EITHER COLUMN "G" (VERTEBRATE) OR COLUMN "J" (INVERTEBRATE). THE 'CV' WILL BE PICKED UP FOR THE CALCULATIONS BELOW. THE DEFAULT VALUES FOR eA, eB, AND eC WILL CHANGE IF THE 'CV' IS ANYTHING OTHER THAN 0.6.

	Vertebrate IC_{25} Data or LC_{50} Data ***********	LN of data		Invertebrate IC_{25} Data or LC_{50} Data ************	LN of data
1	0		1	0	
2			2		
3			3		
4			4		
5			5		
6			6		
7			7		
8			8		
9			9		
10			10		
11			11		
12			12		
13			13		
14			14		
15			15		
16			16		
17			17		
18			18		
19			19		
20			20		
St Dev	NEED DATA	NEED DATA	St Dev	NEED DATA	NEED DATA
Mean	0	0	Mean	0	0
Variance	0	0.000000	Variance	0	0.000000
CV	0		CV	0	

Coefficient of Variation for effluent tests

CV = 0.6 (Default 0.6)

δ^2 = 0.3074847
δ = 0.554513029

Using the log variance to develop eA
(P. 100, step 2a of TSD)
Z = 1.881 (97% probability stat from table
A = -0.88929666
eA = 0.410944686

Using the log variance to develop eB
(P. 100, step 2b of TSD)
δ_4^2 = 0.086177696
δ_4 = 0.293560379
B = -0.50909823
eB = 0.601037335

Using the log variance to develop eC
(P. 100, step 4a of TSD)

δ^2 = 0.3074847
δ = 0.554513029
C = 0.889296658
eC = 2.433417525

Using the log variance to develop eD
(P. 100, step 4b of TSD)
n = 1 This number will most likely stay as "1", for 1 sample/month.
δ_n^2 = 0.3074847
δ_n = 0.554513029
D = 0.889296658
eD = 2.433417525

Page 3 - Follow directions to develop a site specific ACR (Acute to Chronic Ratio)

To determine Acute/Chronic Ratio (ACR), insert usable data below. Usable data is defined as valid paired test results, acute and chronic, tested at the same temperature, same species. The chronic NOEC must be less than the acute LC_{50}, since the ACR divides the LC_{50} by the NOEC. LC_{50}'s >100% should not be used.

Table 1. ACR using Vertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA

ACR for vertebrate data: 0

Table 1. Result:	Vertebrate ACR	0
Table 2. Result:	Invertebrate ACR	0
	Lowest ACR	Default to 10

Table 2. ACR using Invertebrate data

Set #	LC_{50}	NOEC	Test ACR	Logarithm	Geomean	Antilog	ACR to Use
1	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
2	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
3	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
5	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
7	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
9	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA
10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	NO DATA

ACR for vertebrate data: 0

Convert LC_{50}'s and NOEC's to Chronic TU's for use in WLA.EXE

Table 3. ACR used: 10

	Enter LC_{50}	TUc	Enter NOEC	TUc
1		NO DATA		NO DATA
2		NO DATA		NO DATA
3		NO DATA		NO DATA
4		NO DATA		NO DATA
5		NO DATA		NO DATA
6		NO DATA		NO DATA
7		NO DATA		NO DATA
8		NO DATA		NO DATA
9		NO DATA		NO DATA
10		NO DATA		NO DATA
11		NO DATA		NO DATA
12		NO DATA		NO DATA
13		NO DATA		NO DATA
14		NO DATA		NO DATA
15		NO DATA		NO DATA
16		NO DATA		NO DATA
17		NO DATA		NO DATA
18		NO DATA		NO DATA
19		NO DATA		NO DATA
20		NO DATA		NO DATA

If WLA.EXE determines that an acute limit is needed, you need to convert the TUc answer you get to TUa and then an LC50, enter it here:

enter it here:	NO DATA	$\%LC_{50}$
	NO DATA	TUa

DILUTION SERIES TO RECOMMEND

Table 4.

	Monitoring % Effluent	Monitoring TUc	Limit % Effluent	Limit TUc
Dilution series based on data mean	100	1.0		
Dilution series to use for limit			68	1.4705882
Dilution factor to recommend:	0.5		0.8246211	
Dilution series to recommend:	100.0	1.00	100.0	1.00
	50.0	2.00	82.5	1.21
	25.0	4.00	68.0	1.47
	12.5	8.00	56.1	1.78
	6.25	16.00	46.2	2.16
Extra dilutions if needed	3.12	32.05	38.1	2.62
	1.56	64.10	31.4	3.18

Cell: I9
Comment:
This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: K18
Comment: This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: J22
Comment: Remember to change the "N" to "Y" if you have ratios entered, otherwise, they won't be used in the calculations.

Cell: C40
Comment:
If you have entered data to calculate an ACR on page 3, and this is still defaulted to "10", make sure you have selected "Y" in cell E21

Cell: C41
Comment: If you have entered data to calculate an effluent specific CV on page 2, and this is still defaulted to "0.6", make sure you have selected "Y" in cell E20

Cell: L48
Comment:
See Row 151 for the appropriate dilution series to use for these NOEC's

Cell: G62
Comment:
Vertebrates are:
Pimephales promelas
Oncorhynchus mykiss
Cyprinodon variegatus

Cell: J62
Comment:
Invertebrates are:
Ceriodaphnia dubia
Mysidopsis bahia

Cell: C117
Comment: Vertebrates are:

Pimephales promelas
Cyprinodon variegatus

Cell: M119
Comment: The ACR has been picked up from cell C34 on Page 1. If you have paired data to calculate an ACR, enter it in the tables to the left, and make sure you have a "Y" in cell E21 on Page 1. Otherwise, the default of 10 will be used to convert your acute data.

Cell: M121
Comment: If you are only concerned with acute data, you can enter it in the NOEC column for conversion and the number calculated will be equivalent to the TUa. The calculation is the same: 100/NOEC = TUc or 100/LC50 = TUa.

Cell: C138
Comment: Invertebrates are:

Ceriodaphnia dubia
Mysidopsis bahia

Jan 21 03 12:14p 7035501071

[redacted]

COMMONWEALTH of VIRGINIA

STATE WATER CONTROL BOARD
2111 Hamilton Street

R. V. Davis, P. E.
Executive Director

Post Office Box 11143
Richmond, Virginia 23230
(804) 257-0056

MAR 1 1983

Good job

Mr. Richard Gozikowski
Director
Wastewater Treatment Division
County of Fairfax
4100 Chain Bridge Road
Fairfax, VA 22030

Re: Lower Potomac STP (NPDES No. VA0025364)

Dear Mr. Gozikowski:

By letter dated Feburary 16, 1983, from Robert J. Mitkus, Acting Director, Evnrionmental Services Division, Region III, U. S. Environmental Protection Agency (EPA), we have received limited-use approval of a request for use of an alternate test procedure for total phosphorus analyses at the referenced facility's laboratory. In accordance with the above, the State Water Control Board joins with EPA in its approval of the requested alternate method.

This approval for use of the stannous chloride procedure for total phosphorus determinations is authorized with the understanding that this method is limited to monitoring effluent samples from the following facilities:

1. Lower Potomac STP (NPDES No. VA0025364)
2. Little Hunting Creek STP (NPDES No. VA0025372)
3. Convict Road Camp #30 STP (NPDES No. VA0023574)
4. Lorton Correctional Unit STP (NPDES No. VA0030163)
5. Harbor View Subdivision STP (NPDES No. VA0029416)

Both the Board and EPA commend the manner in which the data supporting the requested procedure was presented and documented.

If you have any questions concerning this approval, please feel free to contact our Northern Regional Office.

Sincerely,

R. V. Davis, P.E.
Acting Executive Director

cc SWCB-Bureau of Applied Technology
SWCB-Northern Regional Office
USEPA-Region III

RECEIVED
MAR - 7 1983
Office
Waste Management
Public Works

An Affirmative Action/Equal Opportunity Employer

Attachment 13

cy - CUD
MAB
BAT
BE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
6TH AND WALNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

FEB 16 1983

Mr. Robert V. Davis
Executive Secretary
Commonwealth of Virginia
State Water Control Board
2111 Hamilton Street
Richmond, Virginia 23230

RE: 42-0405-2-63

Dear Mr. Davis:

Your correspondence, referenced above, requested approval of the application for a variance in test methodology submitted on the behalf of the County of Fairfax. The county's Lower Potomac Wastewater Treatment Plant wishes to use an alternate test method for total phosphorous analyses instead of an approved procedure. They propose to use the stannous chloride procedure when analyzing the following NPDES permittee effluents:

1. VA0023574 - Convict Road Camp #30
2. VA0030163 - Lorton Correctional Unit
3. VA0025372 - Little Hunting Creek STP
4. VA0025364 - Lower Potomac STP
5. VA0029416 - Harbor View Subdivision STP

The Water Management and Environmental Services Divisions, as well as the Cincinnati Environmental Monitoring and Support Laboratory (EMSL-Cincinnati) have carefully reviewed the application, In their technical review, EMSL-Cincinnati stated that the statistical analyses of the comparability data provided in support of the request indicate no significant statistical difference in precision of accuracy when compared to the data from use of the U.S.-EPA approved procedure. EMSL-Cincinnati also stated that the County of Fairfax, Department of Public Works, should be commended for the excellent manner in which the performance of the proposed methodology was documented and presented for review. All groups recommended approval of the request.

On the basis of their recommendations and in compliance with the recommendations from the Virginia State Water Control Board, limited-use approval is granted for the use of the stannous chloride procedure for total phosphorous by the Lower Potomac Wastewater Treatment Plant laboratory. The laboratory may use this procedure when monitoring the NPDES effluents listed above.

Sincerely,

Robert J. Mitkus

Robert J. Mitkus, Acting Director
Environmental Services Division

PHOSPHATE

Phosphorus occurs in natural waters and waste waters almost exclusively in the form of various forms of phosphate. These forms are commonly classified as orthophosphates, condensed phosphates, and organically bound phosphates. The various forms may occur as soluble phosphates, or they may be present in particulate matter or in the bodies of aquatic organisms. Phosphorus enters waste water and polluted water from various sources. Large quantities of condensed phosphates may be added to wastewater from commercial cleaning products. Organic phosphates are formed primarily in biological processes, and are contributed to sewage in body and food wastes. Organic phosphate may also be formed from orthophosphates in biological treatment processes, or by organisms in receiving waters.

Phosphorus is essential to the growth of organisms and can often be the nutrient which limits the amount of growth that a body of water can support. Discharge of effluents from secondary treatment processes, which remove little phosphorus, can stimulate excessive growth of photosynthetic aquatic organisms in receiving waters.

Phosphate anaylsis requires two procedural steps:
(1) the conversion of the phosphorus form to soluble orthophosphate; and
(2) a colorimetric determination of soluble orthophosphate. The total phosphorus content of the sample includes all of the orthophosphates and condensed phosphates, both soluble and insoluble, and organic and inorganic phosphorus. Total phosphate analysis requires a digestion method that will convert organic phosphate to orthophosphate.

The severity of the oxidation required depends upon the form, and to some extent, the amount of organic phosphate present. The persulfate oxidation technique is suitable for wastewater and stream samples. Perchloric acid digestion, the most rigorous method, is used with samples such as sediments.

The selection of a colorimetric method* for orthophosphate determination depends largely on the concentration of orthophosphate. The stannous chloride method is applicable for the range of 0.01 - 6 mg P/1. A calibration curve must be constructed by carrying suitable volumes of standard phosphate solution through the persulfate digestion procedure.

PERSULFATE DIGESTION METHOD

Apparatus

1. Hot plate
2. Acid-cleaned glassware
3. Porcelain spatula

Procedure

1. Place appropriate volume of thoroughly mixed sample in an acid-cleaned flask.
2. Add 1 ml 1 N H_2SO_4 to sample flask and a blank.
3. Add $\approx$ 0.4 g potassium persulfate to sample flask and blank using the porcelain spatula.
4. Dilute all flasks to 50 ml with distilled H_2O.
5. Place flasks on hot plate set at high temperature.
6. Allow sample to boil until 5 - 10 ml remains in flask - about 30 minutes.
7. Remove flasks and allow to cool to room temperature.

8. ~~Restore the volume to 50 ml with distilled H_2O.~~

STANNOUS CHLORIDE METHOD FOR COLORIMETRIC DETERMINATION OF ORTHOPHOSPHATE

The principle of this method involves the formation of molybdophosphoric acid, which is reduced to the intensely colored complex, molybdenum blue, by stannous chloride. Color development is measured with a spectrophotometer at 690 mμ. Milligrams P is calculated from %T using a standard phosphate calibration curve.

Apparatus

1. Spectrophotometer, for use at 690 mμ.

Procedure

1. Add 2.0 ml molybdenum reagent to sample flasks and blank.
2. Add 2 drops stannous chloride to sample flasks and blank and swirl to mix.
3. After 10 minutes, but before 12 minutes, read the %T at 690 mμ, using the blank to calibrate the spectrophotometer.
4. Record mg P using the standard solution calibration curve.

Calculations

Calculate the results with the following equation:

$$\text{mg/l P} = \frac{\text{mg P} \times 1000}{\text{ml sample used}}$$

Notes

1. %T should fall between 30% and 70% to yield the most accurate results. If the %T falls outside these values, the test may be repeated, at the

discretion of the supervisor, using a smaller or larger sample size.

2. If repeats cannot be run the same day, the persulfate digestion step may be performed and the digested sample saved overnight. (Entire procedure can also be performed the following day on refridgerated sample.)

PHOSPHORUS REAGENTS

POTASSIUM PHOSPHATE STOCK SOLUTION

Dissolve 2.1965g of predried (105°C for 1 hr.) anhydrous potassium dihydrogen phosphate, monobasic, KH_2PO_4, in approximately 500 ml in a volumetric flask. Dilute to volume. Stock = 500 mg/L.

WORKING STANDARD SOLUTION, 2.5 mg/L

Using volumetric glassware, dilute 5 ml of the Stock Solution to 1000 ml using reagent grade water.

11 NORMAL SULFURIC ACID SOLUTION

Add 620 ml of concentrated H_2SO_4 to about 1200 ml of reagent grade water, cool to room temperature, and dilute to 2 L with reagent grade water.

AMMONIUM MOLYBDATE SOLUTION

Dissolve 100 g of Ammonium Molybdate into 700 ml of reagent grade water. Cautiously add 310 ml of concentrated H_2SO_4 to 1600 ml of reagent grade water, and cool to room temperature. Add the molybdate solution to the acid solution, and dilute to 4 L.

STANNOUS CHLORIDE SOLUTION

Dissolve 12.5 g of $SnCl_2$ $*2H_2O$ into 500 ml of Glycerol (Glycerine), using <u>dry</u> glassware. The Glycerol should be heated, using a hotplate/magnetic stirrer unit to insure the complete dissolution of the stannous chloride.

Public Notice – Environmental Permit

PURPOSE OF NOTICE: To seek public comment on a draft permit from the Department of Environmental Quality that will allow the release of treated wastewater into a water body in Fairfax County, Virginia.

PUBLIC COMMENT PERIOD: XXX, 2013 to XXX, 2013

PERMIT NAME: Virginia Pollutant Discharge Elimination System Permit – Wastewater] issued by DEQ, under the authority of the State Water Control Board

APPLICANT NAME, ADDRESS AND PERMIT NUMBER: Fairfax County Board of Supervisors, P. O. Box 268, Lorton, VA 22079, VA0025364

NAME AND ADDRESS OF FACILITY: Noman M. Cole Pollution Control Plant, 9399 Richmond Highway, Lorton, Virginia 22079

This facility is an Extraordinary Environmental Enterprise participant in Virginia's Environmental Excellence Program.

PROJECT DESCRIPTION: Fairfax County Board of Supervisors has applied for a reissuance of a permit for the public Noman M. Cole Pollution Control Plant. The applicant proposes to release treated sewage wastewaters from residential, commercial, and industrial areas at a rate of 67 million gallons per day into a water body. The sludge will be disposed by incineration then taken to a landfill. The facility proposes to release the treated sewage in the Pohick Creek in Fairfax County in the Potomac River watershed. A watershed is the land area drained by a river and its incoming streams. The permit will limit the following pollutants to amounts that protect water quality: pH, $cBOD_5$, Chlorine, Total Phosphorus, Total Nitrogen (calendar year concentration), Dissolved Oxygen, Ammonia as Nitrogen, and *E. coli* bacteria.

This facility is subject to the requirements of 9 VAC 25-820 and has registered for coverage under the General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Watershed in Virginia.

Additionally, the facility maintains a pretreatment program in accordance with Part VII of 9 VAC25-31. The boilerplate language for permits issued to significant industrial users, part of the pretreatment procedures, has been updated.

HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by hand-delivery, e-mail, fax or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. A public hearing may be held, including another comment period, if public response is significant, based on individual requests for a public hearing, and there are substantial, disputed issues relevant to the permit.

CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS AND ADDITIONAL INFORMATION: The public may review the draft permit and application at the DEQ-Northern Regional Office by appointment, or may request electronic copies of the draft permit and fact sheet.
Name: Joan C. Crowther
Address: DEQ-Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193
Phone: (703) 583-3925 E-mail: joan.crowther@deq.virginia.gov Fax: (703) 583-3821